Delaware Coastal Programs

Section 309
Enhancement Assessment and Strategy

A Response to Section 309 of the
Federal Coastal Zone Management Act

2011

Prepared by the Delaware Coastal Programs

Delaware Department of Natural Resources and Environmental Control

Planning for the Future of a Changing Coast

I. Introduction

For thousands of years, people have been drawn to the world's coastal areas. Today, coastal areas throughout the United States are hubs of commerce, recreation, and tourism. More than half of the nation's population lives near the coast. As the coastal population continues to grow, the health of valuable natural resources, many of which sustain local economies, is increasingly at risk.

In Delaware this dynamic area, also known as the Coastal Zone, provides critical habitat for many species including waterfowl, wildlife, fish, and marine mammals. It also provides recreational opportunities, port access, and water resources critical to the State's economy. Managing conflicts between uses of irreplaceable resources is a complex and continuously changing challenge in Delaware.

The Delaware Coastal Programs (DCP) exists to help meet this challenge. The program strives to manage the conflict between humans and nature occurring in the Coastal Zone. Matching grants from the National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Resource Management (NOAA/OCRM) supports projects and staffing to help accomplish this crucial task. The DCP is housed within the Delaware Department of Natural Resources and Environmental Control (DNREC). The program coordinates its efforts throughout DNREC and with other public and private organizations, helping to protect the state's coastal environment against increasing pressures ranging from residential development and competing demands of recreation and commerce on our waters to numerous coastal hazards including sea level rise.

Congress recognized the continuous challenge for coastal programs to adapt to the dynamic nature of Coastal Zone Management in 1990 when it re-authorized the Coastal Zone Management Act (CZMA). Congress recognized the need to build upon the highly successful program to improve coastal management nationwide and to "enhance" the coastal zone of each state through its coastal program. This led to Delaware's first Section 309 Enhancement Assessment in 1992, which for the first time took an in-depth look at what had been accomplished in Delaware's Coastal Zone as well as what tasks remained to be done. This assessment continues to be updated periodically as part of ongoing efforts to improve the management of Delaware's coastal resources.

Section 309 Assessment and Strategy Development

This document will revisit the 2005 309 Assessment and evaluate the progress made, as well as any ground lost, on the management front of Delaware's coastal resources. It has been prepared in accordance with the Final Section 309 Guidance issued by NOAA's OCRM in July 2009. Section 309 of the Coastal Zone Protection Act of 1996 (PL 104-540) encourages all states with approved Coastal Management Programs to revise their previous Section 309 Assessment & Strategy and develop a new Section 309 Strategy to achieve program changes that improve the management of coastal resources. Program changes proposed in the 309 Strategy should be related to one or more of the following coastal zone enhancement areas: Coastal Wetlands, Coastal Hazards, Public Access, Marine Debris, Cumulative and Secondary Impacts, Special Area Management Planning, Ocean Resources, Energy and Government Facility Siting, and Aquaculture.

The Delaware Coastal Programs has prepared a new Section 309 Enhancement Strategy to implement changes that improve coastal management for those enhancement areas identified as the highest priority needs for protecting Delaware's coastal resources.

Public Review Process

Upon completion, the draft 2010 309 Assessment and Strategy was made available to the public for review and comment. The DCP announced the availability of the report for review, making the document available on its website for a 30-day public comment period. No comments were received.

II. Summary of Completed Section 309 Efforts

Delaware's 2005 Section 309 Enhancement Assessment and the Enhancement Strategy were submitted in accordance with the Federal Coastal Zone Enhancement Grants Program. And identified three of the enhancement areas emerged as high priority areas meriting immediate attention. These areas included: Special Area Management Planning, Cumulative and Secondary Impacts, and Ocean Resources.

Summary of the Proposed 2005 Section 309 Enhancement Strategy

The 2005 Enhancement Strategy is the strategy the DCP proposed to undertake to improve coastal resource management in three priority areas: *Special Area Management Planning, Ocean Resources, and Cumulative and Secondary Impacts*. The DCP identified key issues and program needs for each priority area which would result in changes to enhance the State's Coastal Management Program.

Special Area Management Planning

South Wilmington SAMP

The 2005 Enhancement Strategy identified a South Wilmington Area for Special Area Management Planning to revitalize the waterfront and the adjacent neighborhood of Southbridge. The South Wilmington SAMP identified necessary steps to build capacity and implement the SAMP including Development of a Neighborhood Plan; A Comprehensive Review of Legal Authorities; Development of an Environmental and Ecological Characterization and Enhancement Plan; Development of a Non-Residential Area Sustainable Economic Development Plan; Development of a Stormwater and Flood Relief Plan; and Public Outreach and Public Participation. The results and recommendations from each of these plans would culminate into a comprehensive action plan to guide the successful revitalization of the South Wilmington Area. The development of these planning and guidance documents set the stage for an incredible amount of on-the-ground work that has included youth employment programs, job training programs, major sewer and drainage system improvements, transportation enhancements, housing rehabilitation, economic development programs and business assistance, creation of community benefit agreements with developers and community beautification projects. Most importantly however, the SAMP provided a venue to build trust between project partners and built capacity in the community to achieve the vision that they created for themselves.

The responsibility of implementing the results and recommendations of the SAMP has been taken over by the Southbridge Coordination Group (comprised of community leaders and elected officials) and the City of Wilmington. Other project partners, such as the Wilmington Metropolitan Planning Council, have embedded SAMP goals and recommended projects into their multi-year plans and are actively pursuing on-the-ground implementation projects, in coordination with the residents of the neighborhood.

Ocean Resources

Delaware Bay Benthic Habitat Mapping Project

Analysis of uses and resources of the Delaware Bay revealed the existence of multiple conflicts including commercial and recreational fishing, maritime transportation (including issues related to dredging and port infrastructure), and exploitation of sand resources for beach nourishment. The DCP Delaware Bay Benthic Habitat Mapping Project and Policy Implication Review for Use of this

data for coastal and ocean resource management was implemented to collect data and develop benthic habitat maps of Delaware Bay, thus providing a new tool for coastal resource managers so that they would be able to identify the spatial distribution of benthic community types and consider the policy implications of this new data related to effective management of the Delaware Bay and its commercial and recreational activities.

The Delaware Bay Benthic Mapping Project mapped the benthic and sub-bottom sediments to generate benthic and habitat maps for the entirety of Delaware's bay and river (encompassing ~ 380 square miles) and a total area of 480 square miles (in Delaware, New Jersey, and Pennsylvania water). The remaining areas are in deeper waters that are toward the central axis of the bay toward the central and southern extent of the bay. These regions require a larger survey vessel to safely map these regions, so the Coastal Program has contracted with the Delaware Fisheries Section to complete the mapping. The DCP is utilizing NOAA's Digital Coast and the Delaware Datamil for public distribution of the data (both continuous sediment distribution data, grab samples, areas of oyster beds, deposition zones, scour zones, SAV, and *Sabellaria vulgaris* habitat).

Cumulative and Secondary Impacts

Coordinate the Complex Issues Associated with Development of Regional Sediment Management (RSM) strategies in the Delaware Inland Bays, Atlantic Coast, and Lower Delaware Bay.

The DCP identified the need to consider the utility of using a SAMP to coordinate the complex issues associated with the development of regional sediment management (RSM) strategies in the Delaware Inland Bays, Atlantic Coast, and Lower Delaware Bay. In Delaware, the increase in population and concurrent demand on Delaware's resources has put an increased strain on the State's effort to properly manage those resources. Improved management techniques can have benefits beyond maintenance activities, including improved habitat for benthic organisms as the region will be disturbed less frequently. Practical application of the benthic mapping initiative enabled the DCP to identify offshore sand resource sites for beach replenishment for the coastal communities. These efforts are critical in planning efforts for regional sand management.

Upon initiating discussions for RSM strategies, it became apparent that other agencies and non-profit organizations were undertaking similar planning efforts. Through a variety of local and regional projects and studies including DNREC's Shoreline and Waterway Management Section 10 year management plan for Delaware beaches, the US Army Corps of Engineers dredge material management program, and other work contracted to the Center for the Inland Bays, it was determined that the DCP's efforts at this time would be duplicative. If these efforts fail to assist in the management of long-term economic and ecologic implications for sediment management activities, the DCP may re-evaluate the need to further coordinate RSM efforts.

Coastal Hazards

Sea Level Rise Policy

As part of its Sea Level Rise (SLR) Initiative, the Delaware Coastal Programs (DCP) developed a sea level rise policy that would inform and guide decision-making within the DNREC. The SLR Policy was developed with the advisement of an ad hoc technical committee comprised of DNREC scientists, representatives from Delaware's two National Estuary Programs and University of Delaware scientists who reviewed current literature on sea level rise and provided recommendations regarding planning scenarios. The committee recommended planning scenarios that mirror Federal agency recommendations and local conditions. From these efforts, planning scenarios of 0.5, 1.0 and 1.5 meters of sea level rise by the year 2100 resulted and a white paper was written to describe pertinent federal agency recommendations and factors influencing local rates of sea level rise used in the development of these scenario levels.

Using Delaware's statewide LiDAR dataset, bathtub inundation models were developed for use with the new policy. GIS layers depicting inundation at Mean Higher High Water (MHHW), MHHW plus 0.5 meters, MHHW plus 1.0 meters and MHHW plus 1.5 meters have been made available to all DNREC staff and other interested parties. These layers will also provide the basis for a statewide sea level rise vulnerability assessment. The policy itself directs each DNREC program to communicate the potential consequences of sea level rise, to consider the effects of sea level rise on their programs and to conduct vulnerability assessments on their holdings. The policy was signed in January, 2010 and was effective February 1, 2010.

Education and Outreach

To further the implementation of the Department's SLR Policy the DCP developed a five-part seminar series for DNREC staff, offering assistance to programs in understanding the need for risk assessments and tools and information to evaluate their vulnerability. The seminar series included an introduction of the SLR Initiative DNREC's SLR policy, assisting communities in resiliency planning, understanding the perceptions Delaware residents have regarding SRL, tools and information available for SLR planning, and SLR impacts occurring in Delaware today.

Additionally, DCP staff conducted presentations for local governments and private organizations relaying the potential for SRL in Delaware, assessing risks and vulnerabilities and planning for the future to reduce impacts.

Sea Level Rise Marsh Model (SLAMM)

Prime Hook National Wildlife Refuge, as part of their Comprehensive Conservation Plan (CCP) development, is required to estimate the effects of sea level rise on the Refuge. The United States Fish and Wildlife Service recommended using the Sea Level Affecting Marshes Model (SLAMM) for this application. The DCP assisted the Refuge in using the model to predict the land cover changes due to sea level rise. Processes evaluated in the application include inundation, erosion, overwash, and saturation.

It is the Refuge management's responsibility to interpret the results as they deem appropriate. The results are only estimates based on limited input factors and historic data. As with any attempt to model natural conditions there is always a high degree of uncertainty. However, certain conditions are apparent under all scenarios and could be a good predictor of the future environment at the refuge. By the year 2050 at least half of the current upland area of the refuge will be lost, decreasing from 20% (9000 ha) to at most 12% (5000 ha) of the property and open water and tidal mud flat areas will increase throughout the next 100 years. This is just one example of how the DCP is assisting coastal managers in Delaware understand their holding's vulnerabilities and begin preparing for the impacts of SLR in a proactive manner.

Program Change/Update

The DCP worked with OCRM to comprehensively review and update the program's enforceable policies. This process included an individual review and discussion of each policy set forth within the policy document. For each policy a determination was made based the program's ability to enforce the policy and how applicable each was to the program. OCRM staff provided comments and recommendations to maintain or remove policies and identified opportunities to clarify and/or strengthen existing policy language. The Comprehensive Update and Routine Program Implementation was completed and approved by NOAA in February, 2010.

III. Assessment

Wetlands

Section 309 Enhancement Objective
Protection, restoration, or enhancement of the existing coastal wetlands base, or creation of new coastal wetlands

Resource Characterization
Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

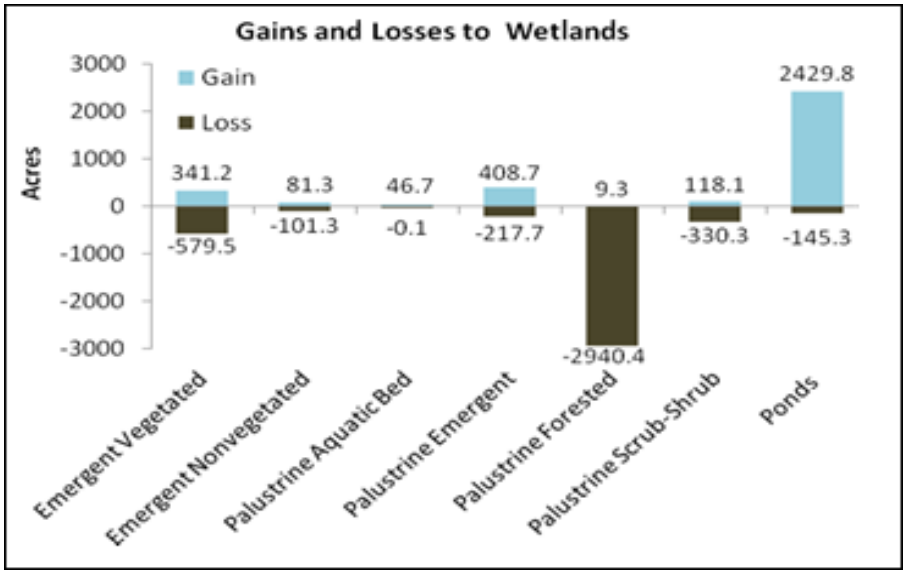
Wetlands Trends and Status

Current Extent includes those wetlands mapped/characterized up through 2007.

Wetlands Type	Current [2007] Extent (Acres)
Tidal (Vegetated)	83,371
Tidal (Non-Vegetated)	2,551
Non-tidal / Freshwater	171,864
Other (H-wetlands)*	62,291

* H-Wetlands are areas with hydric soils and natural vegetation, but a wet signature on the aerial photo could not be detected; on the ground verification required.

Trends for period of 1992-2007



Estimated Historic Extent and Losses

The exact acreage of historic wetlands extent is unknown. However, from analyses derived from hydric soils data, Delaware may have lost as much as 54% of its wetlands since the 1780's. Anthropological impacts affecting wetlands overtime include but are not limited to filling from commercial, industrial and residential development; dredged material disposal; dredging for navigation; conversion of wetland forests to agriculture; alteration of hydrology and the creation of diked impoundments for water supply and wildlife management. From the early 1980's through the early 1990's the primary loss was that of non-tidal, forested wetlands to residential and development and agricultural conversion. Delaware continues to lose wetland acreage even with the federal 404 program.

Most losses are palustrine forested wetland types. Additional estuarine losses seen resulted from a possible combination of eroding sediment and rising sea levels leading to the conversion of vegetated wetlands to open water flats. Gains seen during the time period were almost exclusively low functioning open water ponds, for example, stormwater ponds primarily to control water quantity and not designed to affect water quality

Mitigation Tracking

Due to the structure of the wetlands permitting process in Delaware, with multiple state offices and federal agencies permitting impacts to wetlands habitats having no standardized tracking methods, a quantification of the number of acres gained, either through a voluntary mechanism or through mitigation cannot be completed at this time. The DNREC has been working with the US Army Corps of Engineers (USACE) to obtain wetlands impacts and mitigation data for several years and while some information has been received, the format and inconsistencies of routine data entry have lead to a difficult and time consuming analysis. However, the USACE has recently adopted a new database system which may help rectify some issues in data analysis and dissemination. Additionally, the DCP has contracted for the development of a new database for the tracking of federal consistency activities and related habitat impacts.

Monitoring Programs

By better understanding the health of our wetlands, we can better understand how to restore them and protect them from actions that cause damage. Wetlands provide many important services to humans and the environment including: improving water quality, providing habitat for fish, wildlife and rare plants, protecting us from flooding and storm damage, and providing open space on the landscape. The less healthy a wetland is the less likely it is that it can provide these services to its fullest abilities. The data we obtain from assessing our wetlands is being used to design wetland restoration plans for watersheds, better understand how certain land use decisions affect the health of our wetlands and identify policy needs such as the protection of freshwater wetlands which have experienced higher rates of loss.

Monitoring programs are currently being used in both tidal and non-tidal wetlands which will provide better assessment of changes over time. Future trend studies are planned to evaluate both acreage and functional loss. Delaware currently has comprehensive and rapid assessment methodologies for non-tidal wetlands and the Mid-Atlantic rapid assessment for tidal wetlands.

Direct and indirect threats to coastal wetlands, both natural and man-made

Type of Threat	**Severity of Impacts (H, M, L)**	**Geographic Scope of Impacts (extensive or limited)**	**Irreversibility (H, M, L)**
Development/Fill	High	Moderate	High
Alteration of Hydrology	Medium	Moderate	Medium
Erosion	Medium	Moderate	Medium
Pollution	Medium	Limited	Medium
Channelization	Low	Limited	Medium
Nuisance or Exotic Species	Medium	Moderate	Medium
Fresh Water input	Low	Limited	Medium
Sea Level Rise	High	Extensive	High

Wetland Threats

Sea Level Rise

Coastal areas and natural resources are particularly vulnerable to climate change, especially with respect to accelerated sea level rise, shoreline erosion, increased storm frequency and intensity, changes in rainfall, and related flooding among other potential impacts. Investigations of such impacts, specifically marsh depletion and increased mudflats, such as those at the Bombay Hook NWR, highlight the critical need to conduct hydrodynamic studies to determine patterns of sediment flux in or out of the depleted marsh area.

In the Bombay Hook National Wildlife Refuge (NWR) pilot project, data collection involves conducting river transects within the Leipsic River using the Acoustic Doppler Current Profiler (ADCP) to collect and process tide and current data. Water quality is also being monitored; specifically total sediment solids (TSS) to aid in determining sediment fluxes in or out of the depleted marsh area. Results of this study will be used to predict future changes in marsh depletion and to help determine marsh management techniques to counteract these impacts affecting the tidal marshes at Bombay Hook.

Delaware also has large acreages of impoundment coastal wetlands. Problems are already occurring in these systems without documented acceleration in sea level rise. With the anticipated increase in the rate of relative sea-level rise to further stress impounded marshes; there is a greater need to evaluate the long-term sustainability and utility of impoundments in Delaware. In order to do so, baseline data on historic sedimentation rates is needed to provide long-term sedimentation rates in impounded and natural wetlands that can then be utilized to evaluate the impounded wetlands' ability to achieve optimal habitat benefit under different management strategies and under different sea level rise scenarios.

Long-term 100-yr and 50-yr sedimentation rates can be calculated by collecting radioisotopic cores from wetland areas and analyzing them for 210Pb and 137Cs. All core sites and the adjacent wetland will be surveyed to tie all data to the tidal datum (NAVD 88). Correlating long-term wetland sedimentation rates to current wetland elevation will enable a detailed analysis of the potential sedimentation deficits that exist within the impoundments, as compared to the reference wetlands. The elevation and sedimentation gradients between the reference and impounded wetlands can be used to calculate potential future elevation trajectories under different sea-level rise and management scenarios. However, this information, coupled with detailed hydrodynamic modeling is necessary to fully understand sedimentation transportation dynamics.

Development

The State of Delaware has been facing tremendous developmental pressures over the past decade due to an influx of businesses attracted to the state by friendly tax laws and great economic growth. Development that occurs in areas typically thought to be environmentally sensitive often require small fills of wetlands, which cumulatively may lead to significant impacts at a Statewide scale. Wetland fills of over 1 acre are normally not permitted by the State; however, numerous small impacts can fragment the wetland system of a watershed affecting hydrology, function and important habitat. The actual impact of these development activities is believed to be significantly higher than permitted fills due to undocumented small fill efforts and the efforts of landowners that often unknowingly fill small wetlands after occupying newly constructed homes. The State has a limited ability to track the effects of these cumulative impacts.

Water Quality

Increased development in the state has also lead to increased volumes of non-point source pollution in the form of urban runoff. The major pollutant found in runoff from urban areas include sediment, nutrients, oxygen demanding substance, road salts, metals, petroleum hydrocarbons,

pathogenic bacteria and viruses. These pollutants are carried into surface waters and can cause water quality impairments. In addition to urban runoff, Delaware has had a history of problems with nutrient enrichment of inland waterbodies due to runoff. This problem is exacerbated by losses of wetlands to development activities, thereby reducing the system's ability to deal with excess nutrients. In 2008, Delaware approved and released the Inland Bays Pollution Control Strategy (PCS). The strategy and accompanying regulations are designed to reduce the amounts of nitrogen and phosphorus entering the Indian River, Indian River Bay, Rehoboth Bay, the Little Assawoman Bay and their tributaries to the level required by the Total Maximum Daily Loads for these watersheds. New policies for use in federal consistency certification were developed and incorporated by the DCP based on the TMDL regulations.

TMDLs have also been established for the Appoquinimink River, the Christina River Basin, Red Clay Creek, White Clay Creek, the Murderkill River, the main stems of the Nanticoke River and Broad Creek, Chester, Choptank, and Marshy Hope and their ponds and tributaries. Tributary Action Teams, groups of comprised of engaged citizens and experts working towards reducing pollution entering Delaware's waterbodies, have been organized and are various stages of developing and adopting Pollution Control Strategies for each of these watersheds.

Nationwide Permits

Regional conditions for Army Corps of Engineers (Corps) nationwide permits (NWP) were approved in 2007. Nationwide permits for the State of Delaware continue to be denied in areas designated as Critical Resource Waters. Designated Critical Resource Waters have been determined by the State using parameters such as National Estuarine Research Reserve boundaries, National Wild and Scenic Rivers, critical habitat for federally listed threatened and endangered species, State of Delaware Natural Heritage sites and outstanding natural resource waters. A number of NWPs have also been modified to provide additional requirements or clarification of previous requirements. Delaware has repeatedly requested information from the Corps to assist in determining the overall impacts of the NWP program. The information provided by the Corps earlier this year indicates that the Corps tracking system is insufficient to properly assess the impacts and Delaware is currently assessing other means by which to extrapolate their data for further use by the State.

Mapped Habitat Inventories

Habitat Types	CMP Has Mapped Inventory (Y/N)	Date completed or substantially updated
Tidal Wetlands	Yes	2007
Beach and Dune	Yes	2000 / 2010
Nearshore	Yes	2009

Habitat Restoration and Protection using Non-Federal Funding

Contextual Measure	Cumulative Acres for 2004-2010
Number of acres of coastal habitat restored using non-CZM or non-CELCP funds	1621.3 Acres
Number of acres of coastal habitat protected through acquisition or easement using non-CZM or non-CELCP funds	8,903.04 Acres (2004-2009; FY 10 data not available)

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

Wetlands Management Efforts

Management categories	Employed by State (Y/N)	Significant changes since last assessment (Y/N)
Wetland regulatory program implementation, policies & standards	Yes	Moderate
Wetland protection policies and standards	Yes	No
Wetland assessment methodologies (health, function, extent)	Yes	Yes
Wetland restoration or enhancement programs	Yes	No
Wetland policies related public infrastructure funding		
Wetland mitigation programs and policies	Yes	No
Wetland creation programs and policies	Yes	No
Wetland acquisition programs	Acquisition programs exist, but not specific to wetlands	No
Wetland mapping, GIS, and tracking systems	Yes	Moderate change
Special Area Management Plans	No	No
Wetland research and monitoring	Yes	Yes
Wetland education and outreach	Yes	Yes

Research

Coastal shoreline change, rising sea levels, erosion and land subsidence are increasingly tough issues facing coastal managers, engineers, and planners charged with developing and protecting coastal habitats and communities in vulnerable coastal zones. Understanding these threats depends on early detection, and solutions will require vigorous public debate over engineering solutions vs. strategic retreat. No single, direct cause for the wetland loss has yet been identified. Some potential causes including sea level rise, marsh/land subsidence, and wildlife grazing are being investigated. These effects are inter-related and may work together to exacerbate the problem. Currently DCP and others are using sediment elevation tables, radiometric ores and other tools to explore subsidence and sedimentation in regional marshes. It is hoped that if a cause(s) can be determined, adjustments in marsh management can be made to stem the loss of interior area.

Marsh Vulnerability Index

The DCP will develop a Sea Level Rise Marsh Vulnerability Index (MVI) for Delaware's tidal wetlands. An index is needed to assess the long-term viability of Delaware's marshes under differing sea level rise scenarios and to target areas for conservation, restoration and monitoring. The MVI will be based upon the positive correlation between mean tidal range and elevational growth range of tidal wetland plant species. A watershed specific and statewide MVI will classify healthy, degrading and severely degrading marsh regions. These classifications will be utilized to identify both problem and stable areas enabling policy decisions to be made regarding wetland restoration and protection strategies. Once developed, the MVI tool could be transferred to other states and used for regional comparisons and regional planning.

Coastal Impoundments

As an anticipated rise in sea level further stresses impounded marshes, there is a greater need to evaluate the long-term sustainability and utility of impoundments in Delaware. In order to do this, baseline data regarding historic sedimentation rates is needed. Baseline data sets of long-term sedimentation rates in impounded and natural wetlands can be utilized to evaluate the impounded wetlands' ability to achieve optimal habitat benefit under different management strategies and under different sea level rise scenarios. Correlating long-term wetland sedimentation rates to current wetland elevation will enable a detailed analysis of the potential sedimentation deficits that exist within the impoundments, as compared to the reference wetlands. The elevation and sedimentation gradients between the reference and impounded wetlands can be used to calculate potential future elevation trajectories under different sea-level rise and management scenarios.

When complete, this study will provide information to coastal managers regarding marsh susceptibility to sea level rise under different marsh management scenarios and under different sea level rise scenarios. A long-term comparison of the wetland elevation and sedimentation conditions between the impounded marsh and the "natural" marsh will enable a detailed analysis and comparison of the potential long-term growth conditions and highlight the potential implications for impoundment management that could affect the sustainability of the interior wetlands. This information will allow marsh managers to understand the potential outcomes of sea level rise and adapt their management techniques.

Sediment elevation tables

Sediment elevation tables (SETs) provide a nondestructive method for making highly accurate and precise measurements of sediment elevation in intertidal and subtidal wetlands over long periods of time, relative to a fixed subsurface datum. Data collected using SETs can be used to determine both the influence of a single meteorological event on sediment surface elevation and a long-term trend in elevation change. This information will help increase our understanding of sedimentation rates in different marshes, sea level rise effects in these marshes, and potential management techniques.

Education and Outreach

The Delaware National Estuarine Research Reserve (DNERR) conducts extensive estuarine educational programs for both school-aged children and adults. The DNERR has two components, representing Delaware's diverse estuarine resources – the Blackbird component along the Blackbird Creek in Southern New Castle County and the St. Jones component along the St. Jones River in Kent County. The DNERR offers a variety of educational programs with a goal of enhancing public awareness, understanding, and wise use of estuarine resources in the Middle Atlantic Region and encouraging an environmental ethic among all users. Since the last assessment there has been an increase in the number and diversity of programs offered at the Blackbird Creek Reserve component. This increase can be attributed to the installation of a canoe/kayak ramp in 2008 which allows for more public canoe programs and for public access to the Creek, the renovation of the Blackbird Creek Reserve Stewardship Center (opened in 2010) which is often utilized for coastal training opportunities, and the addition of the Blackbird Creek Fall Festival (added to annual programming in 2007) which has provided opportunities for the communities in and around Townsend, Delaware to explore the Blackbird Creek and encourage public use of the property. The programs offered at the

Reserve have been critical in broadening public awareness and knowledge of key estuarine habitats including tidal and non-tidal wetlands along Blackbird Creek.

Habitat Restoration Plans

Habitat Types	**CMP has a restoration plan (Y/N)**	**Date completed or substantially updated**
Wetlands	"Delaware Wetlands Conservation Strategy"; Northern Delaware Wetlands Restoration Program (freshwater)	2008 Continual Project Implementation
Beach and Dune	"Management Plan for the Delaware Bay Beaches"; Dune Systems (plantings and nourishment) and Atlantic beaches (nourishment)	2010 continually monitored and assessed for restoration needs
Nearshore	No	

Priority Needs and Information Gaps

Gap or need description	**Select type of gap or need** (regulatory, policy, data, training, capacity, communication and outreach)	**Level of Priority (H, M, L)**
Freshwater Wetlands Protection	Regulatory	Medium
Freshwater Wetlands Protection	Education/Outreach	Medium

The DCP is participating in a Department-wide workgroup charged with investigating options to improve the efficiency and effectiveness of protecting and managing wetlands. This group will examine possibilities through regulatory and policy-based improvements by identifying gaps, overlaps and inefficiencies in order to make recommendations for improvements strategies to improve coordination efforts for projects where conflicting program missions may result in impacts not congruent with Department conservation and preservation efforts also being considered.

While lacking a State Freshwater Wetlands Act, coordination between regulatory programs and the CZM continues through the Joint Permit Process (JPP). Although the CZM has no direct oversight of wetlands regulations, through the JPP and federal consistency, the CZM is able to ensure the program's networked policies are enforced.

Enhancement Area Prioritization

While the DCP will not be allocating additional funding, wetlands is to be ranked as a high priority assessment area. With current efforts in wetlands monitoring and research as well as the Department workgroup for wetland conservation, preservation and restoration, wetland issues are being addressed by the DCP and its networked programs. The DCP's strategy for the next 5 yrs will focus on addressing the impacts of sea level rise and coastal hazards, and we will continue to improve our understanding of marsh vulnerability. Some program changes may also arise for wetlands

through these projects. The Delaware Coastal Programs will also continue to work with other Department programs to improve wetland protection regulations or policies.

1. What level of priority is the enhancement for the coastal zone (including, but not limited to, CZMA funding)?

   High ☒
   Medium ☐
   Low ☐

2. Will the CMP develop one or more strategies for this enhancement area?

   Yes ☐
   No ☒

Coastal Hazards

Section 309 Enhancement Objective

Prevent or significantly reduce threats to life and property by eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise and Great Lakes level change

Resource Characterization

Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

The following table provides risk levels and geographic scope of impact for specified coastal hazards.

Type of Hazard	General Level of Risk (H,M,L)	Geographic Scope of Risk (Coast-wide, etc)
Flooding	High	Coast-wide
Coastal storms, including associated storm surge	High	Coast-wide
Geological hazards (e.g., tsunamis, earthquakes)	Low	Coast-wide
Shoreline erosion (including bluff and dune erosion)	High	Coast-wide
Sea level rise and other climate change impacts	High	Coast-wide
Land subsidence	Medium (when coupled with SLR and coastal storms/ flooding)	Coast-wide

Delaware shores are often pounded by coastal storms, locally called "Nor'easters". As a result of the winds and flooding that occur in conjunction with coastal storms and their associated storm surges, Nor'easters frequently generate the most coastal damage (property damage, infrastructure, and beach loss), especially during the winter months, during very short time frames. Delaware continues to improve its preparedness and response for these types of storms through efforts such as working closely with Federal Emergency Management Agency (FEMA) and the Delaware Emergency Management Agency (DEMA) to improve our planning process and mitigation prior to events. Shoreline erosion is also exacerbated by coastal storms as a result of high winds and pounding wave action. Periodic beach nourishment efforts are utilized to help maintain the dune systems.

The risks associated with coastal hazards, including sea level rise are increasing as development continues to grow along the coastal areas of Delaware. Since the last assessment, inundation modeling of the coastal region, marsh elevation research and identification of critical facilities in vulnerable areas has led to increased knowledge of the risks associated with coastal inundation. Based on potential SLR scenarios, quantitative level of risk can be estimated for specific areas across the state. As such, the DCP crafted a department-wide policy requiring all programs to consider potential SLR scenarios and assess potential risks to their current holding and when planning future project in vulnerable areas.

The DCP is proactively working with coastal communities at risk of coastal hazards impact by providing technical and financial assistance for vulnerability assessments and the development of coastal resiliency actions plans. Through this process the DCP is acquiring

knowledge and understanding of risks affecting their communities, and some practical experience about how best to develop effective strategies to address coastal hazards at the community level.

Coastal Hazard Inventories

Type of Hazard	# of communities that have a mapped inventory	Date completed or substantially updated
Flooding	Available statewide	By County: New Castle 2007, Kent 2003, Sussex 2005
Storm surge	1	As part of the SLR Initiative, the DCP has begun the process of mapping storm surge as it coincides with SRL scenarios
Geological hazards (e.g., tsunamis, earthquakes)	0	The extremely low occurrence rate of geologic hazards in DE does not dictate action at this time.
Shoreline erosion	7 (Bay Beach Communities)	2010
Sea level rise	Available statewide	2010
Land subsidence	Available statewide	1988

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

Coastal Hazards Management Efforts

Management Categories	Employed by state (Y/N)	Significant changes since last assessment (Y/N)
Building setbacks/ restrictions	Yes	No
Methodologies for determining setbacks	Yes	No
Repair/rebuilding restrictions	Yes	No
Restriction of hard shoreline protection structures	Yes	DCP included policy in recent program update restricting use of structural shoreline protection except under certain conditions.
Promotion of alternative shoreline stabilization methodologies	Yes	See Above
Renovation of shoreline protection structures	Yes	No
Beach/dune protection (other than setbacks)	Yes	No
Permit compliance	Yes	No
Sediment management plans	Yes	No
Repetitive flood loss policies, (e.g., relocation, buyouts)	Yes	No
Local hazards mitigation planning	Yes	Yes
Local post-disaster redevelopment plans	Yes	No
Real estate sales disclosure requirements	Yes	No
Restrictions on publicly funded infrastructure	Yes	No
Climate change planning and adaptation strategies	Yes	Yes
Special Area Management Plans	No	No
Hazards research and monitoring	Yes	Yes
Hazards education and outreach	Yes	Yes

Local Hazards Mitigation Planning

Coastal Resiliency Action Plans

The DCP is working on two coastal hazards related pilot projects, one in the Town of Bowers Beach and the other in the City of New Castle. The Town of Bowers Beach, Delaware is a small Bayfront community in Kent County located between the St. Jones and the Murderkill River. This small town is home to a small commercial fishing fleet and is a popular place for recreational boaters. The City of New Castle is a historic community protected by four flood control dikes constructed 300-400 years ago to hold back the Bay. Although these locations make them attractive for waterfront living and recreating, their locations also makes them particularly vulnerable to the effects of coastal storms and sea level rise.

These projects are designed to assist these communities in their efforts to reduce coastal hazard vulnerabilities that currently exist and that could potentially increase in the future due to the impacts of sea level rise. Bowers Beach currently experiences a number of coastal related problems including nuisance flooding of streets, episodic storm damage, coastal erosion, and other coastal hazard impacts. The City of New Castle is dealing with expanding development pressures in flood plains, aging tide control structures and improperly maintained flood control dikes experiencing erosion on both the bay and marsh sides, overgrown vegetation and animal impacts which all contribute to the weakening of the structures increasingly threatened by coastal storms and sea level rise.

The goal of these projects is to develop individual community-wide action plans that increase the resiliency of coastal Delaware communities, to the current and future effects of coastal storms and sea level rise. These projects will develop proactive plans that outline specific vulnerabilities of the communities and the best actions to be pursued to address these issues. This will include actions to address current risks as well as future risks associated with climate change, including the potential impacts of sea level rise, increased storm frequencies and intensities, increased rates of erosion, salt water intrusion, wetland loss, and other impacts.

County All- Hazards Mitigation Plans

The three Delaware Counties have finalized or are in the process of finalizing the update of the County All Hazards Mitigation Plans. The purpose of these plans is to provide guidance for hazard mitigation by identifying mitigation goals, objectives and recommended actions and initiatives for county and municipal government to reduce injury and damage from natural and human-caused hazards. The Natural Hazards Section of the Delaware Emergency Management Agency worked with all local jurisdictions to encourage their support of local hazard mitigation planning. The section's staff provided assistance in a number of ways, including on-site visits; training; planning grants; hazard and socio-economic information; local capability and risk assessments; and coordination of information requests between state government, consultants, and participation in local plan development activities.

The State and local government agreed to simultaneously develop mitigation plans at the county level. This approach facilitated the integration of the planning processes. County-level goals and actions were linked, to the goals established in the state Plan. This allowed more effective coordination of municipal, county and state goals. County goals provided valuable feedback to state officials as they developed broader state-level mitigation goals. This bottom-up approach allowed state officials to tailor their mitigation strategies to reflect the needs identified at the local level. County-level risk assessments were conducted in a manner that, when combined, served as the basis for the state-level risk assessment. This approach further linked local vulnerabilities to actions proposed at the state level. The number of local plans,

and the areas they represented, provided adequate information influencing both the risk assessment and the mitigation strategies of the state plan.

Climate Change Planning and Adaptation Strategies

Sea Level Rise Policy and Inundation Mapping

In addition to the development of the Sea Level Rise Policy, detailed in Section II of this document, an early step in the process towards the development of adaptation strategies is the development of Sea Level Rise inundation maps, necessary to determine areas and extent of coastal vulnerability to sea level rise and key components in guiding the development of a Statewide Sea Level Rise Adaptation Plan. While it is relatively straight forward to overlay elevated sea level changes onto existing digital elevation models (DEMs), certain factors must be considered. Primarily, mean tide levels vary along the Delaware Bay Coast and any maps developed must take this into consideration. Secondly, solely using sea level rise will not give a true perspective of inundation, since the major concern will be the flooding from coastal storm surges.

To develop these maps (GIS Layers) a statistical evaluation from the existing 2 long-term NOAA tide level datasets of Lewes (Breakwater Harbor) and Delaware City (Reedy Point) will be performed to establish storm surge elevations above Mean Higher High Water (MHHW) for selected return periods (i.e. 10, 25 50, 100-year return periods). Once these are calculated, the current MHHW levels along the length of the coast will be determined using the NOAA VDatum software. These two datasets will be combined to establish the appropriate elevations to use for coastal inundation. After the Delaware Bay coast is completed, a similar effort will be performed for the Inland Bays and Atlantic Coast.

The Management Plan for the Delaware Bay Beaches

The beaches along the western shore of Delaware Bay have long experienced varying levels of shoreline erosion due to intermittent storm events and the resultant wind, wave, and water level forces acting on the beach system. In the past, beach nourishment projects and shoreline protection structures were implemented on an as-needed basis. The State of Delaware determined there is a need to develop a long-term beach management plan and associated cost analysis. The goal of the plan is a cost-effective strategy for the future management of the Bay beaches. DNREC's Shoreline and Waterway Management Section contracted for the development of a ten-year beach management plan for Delaware Bay Beach communities in Kent and Sussex Counties. The study incorporates existing literature and data, coastal processes modeling, and conceptual beach nourishment designs. The plan provides a great deal of background information concerning the history, processes, and other factors that need to be considered in developing and applying a 10-year management plan for these beaches. This information was applied to present three management plan scenarios for each of the seven communities, including initial beach nourishment construction and total ten year costs.

Hazards Research and Monitoring

In the last two decades, storms such as Hurricanes Katrina and Ike along the Gulf of Mexico and Floyd and Hugo along the Atlantic Coast of the United States have resulted in significant loss of life, injuries and property damages reaching well over 100 billion dollars. Much of the damage associated with these and other tropical and extra-tropical weather systems is associated with severe coastal flooding. The Delaware coastline is extremely

vulnerable to such events, examples being the great March, 1962 storm and the recent coastal flooding incident of May 12, 2008.

Coastal Monitoring GAP Analysis

As part of a cooperative effort between the University of Delaware and several Delaware State Agencies to better monitor conditions along the Delaware coastline and to provide advance warning of impending coastal flooding events, a GAP Analysis of pertinent coastal data needs and a comprehensive survey of inland inundation levels have been conducted for coastal flooding events. The GAP Analysis defines the present state of coastal data collection efforts across the state, an "optimum" data collection network and the gap between them, indicating those data that need to be added to the current network. A survey of high water marks from previous coastal flooding events will be used to create a "baseline" data set to aid in understanding the relationships between water levels at tidal monitoring points and inland locations. In this research, an exhaustive inventory of real-time and archived coastal data will be conducted. This inventory includes meteorological, tidal, buoy, water quality and inundation data sources, along with ancillary sources of coastal information (i.e. research publications, modeling work, etc.). The final report makes recommendations as to the type of data needed to reach an "optimum" coastal monitoring network, and the spatial placement and temporal resolution of additional sensors that may need to be deployed to reach the optimum configuration.

Coastal Storm History

Several coastal communities in Delaware currently experience storm damage, coastal erosion, and other coastal hazard impacts. In efforts to reduce hazard vulnerability that currently exists and that could potentially increase in the future due to climate change impacts, the Delaware Coastal Programs, along with the University of Delaware are compiling data on historical storms, nor'easters, subtropical storms or hurricanes that may have impacted Delaware's coasts in the past.

This data was previously compiled for the DCP for the years 1923-1974 and a written report is available (Technical Report #4, September 1977). This project will focus on updating the storm data from 1974 to 2009 resulting in an updated compendium of historical storm data categorized according to the type of storm, physical characteristics and impacts on coastal communities and natural resources. This can be used to assist in the derivation of specific scenarios to be modeled for the purpose of future adaptation and preparedness. It will also help to identify where outside expertise should be brought in to provide additional technical assistance for resiliency assessment, planning and implementing. Depending on the detail of the data collected, there may be some insight for prediction of the next potential storm, nor'easter or hurricane and the impacts of such events.

Kitts Hummock Inundation Study

To properly understand the relationships between the Delaware Bay, interior marsh water levels, ponds, impoundments and the drainage ditch network around Kitts Hummock, a comprehensive water level monitoring program will be established. Establishing a water level monitoring network at key locations will aid in the understating the interrelationships between the water bodies and the influence of the drainage network in the community on these water bodies. This baseline monitoring is required for conducting any defensible modeling and evaluation of the effectiveness of any proposed drainage improvements to the Kitts Hummock area. Water level monitoring is continuing in anticipation of collecting future flood water elevation data.

Once sufficient data has been collected, which includes a minimum of 3 months of data and at least 3 significant storm events, the data will be compiled. Data on rainfall and wave height, period and direction, currently being monitored by the DNERR, will be incorporated into the data set and then the dataset will be analyzed. This analysis will include examining the Bay tide effects on marsh water/drainage ditch elevations; relationships of surrounding water levels on the Thompson open water area; probable pathways of tide related flooding; and a qualitative evaluation of the expected effectiveness of drainage ditches in the area during different tidal cycles/storm events.

Hazards Education and Outreach

Sea Level Rise Outreach Strategy

In order to effectively design and implement a successful educational and outreach strategy on sea level rise, a statewide survey was conducted to gauge public knowledge and opinions on sea level rise and its impacts on Delaware. The DCP commissioned this study in December 2009 to determine what Delaware residents are thinking about climate change and sea level rise. The study, entitled, *Delaware Residents' Opinions on Climate Change and Sea Level Rise*, was conducted by Responsive Management. It examined residents' basic knowledge and awareness of climate change and sea level rise; opinions on whether climate change and sea level rise are happening; perceptions of taking action to mitigate climate change and sea level rise; and opinions on management strategies and actions pertaining to climate change. The responses to the survey were then analyzed to determine differences between groups (e.g. coastal versus non-coastal residents, males versus females) and demographics.

After the study was complete, the DCP initiated a workgroup consisting of representatives from academia, nonprofit organizations, and state agencies to develop and implement a coordinated sea level rise outreach strategy for the state of Delaware. The Sea Level Rise Outreach Strategy Workgroup established a mission of the strategy which is to engage Delawareans in proactive efforts to adapt to and reduce the impacts of sea level rise and climate change through implementing effective communications strategies. Messages specifically aimed at engaging priority target audiences was developed, and a variety of audiences in the public will be targeted through the outreach strategy to disseminate information and create policy change that will implement adaptation and mitigation actions. This plan will be designed to meet each audience's unique needs for topics, skills, and best delivery methods, including the development of educational materials such as websites, handouts, and message statement.

DNREC Sea Level Rise Seminars

In concert with the effort to disseminate information on sea level rise statewide, the DCP also conducted an internal seminar series for DNREC staff about the science behind sea level rise, the new DNREC sea level rise department policy, and about the tools and technical assistance that are available to help adapt DNREC programs and projects to sea level rise. These seminars also touched on DCP's work on several sea level rise projects. One seminar focused on the resilient coastal community projects – in particular, how DCP combined technical tools and resources with the local knowledge of communities to develop solutions and devise local implementation strategies to increase their resiliency to sea level rise and coastal storms. Another session then focused on DCP's recent research on the impacts of rising sea levels on impoundments and wetlands.

Community Setback Requirements

Contextual Measure	Number of Communities
Number of communities in the coastal zone required by state law or policy to implement setbacks, buffers, or other land use policies to direct develop away from hazardous areas.	All (57 municipalities, 3 counties)
Number of communities in the coastal zone that have setback, buffer, or other land use policies to direct develop away from hazardous areas that are more stringent than state mandated standards or that have policies where no state standards exist.	0

Priority Needs and Information Gaps

Gap or need description	Type of gap or need (regulatory, policy, data, training, capacity, communication & outreach)	Level of priority (H,M,L)
Coastal resiliency plans	Planning/Policy	High
SLR adaption plans for all coastal communities	Planning/Policy	High
Levee Management Legislation	Regulatory	High

Enhancement Area Prioritization

1. What level of priority is the enhancement for the coastal zone (including, but not limited to, CZMA funding)?

   High ☒
   Medium ☐
   Low ☐

2. Will the CMP develop one or more strategies for this enhancement area?

   Yes ☒
   No ☐

The DCP has set the priority level for this enhancement area as high; however, it will not be developing a strategy in this area under 309. Coordination efforts with DNREC's Dam Safety Program and a multiagency work group are underway to evaluate the current status of levee management, and the associate risks, in the State. Work for SRL adaption planning, coastal resiliency and vulnerability assessments and coordination for the development of levee management legislation will be conducted through 306 funding tasks.

Public Access

Section 309 Enhancement Objective
Attain increased opportunities for public access, taking into account current and future public access needs, to coastal areas of recreational, historical, aesthetic, ecological, or cultural value.

Resource Characterization
Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

Threats and Conflicts to Creating and Maintaining Public Access in Coastal Zone

Type of threat or conflict causing loss of access	Degree of threat (H, M, L)	Describe trends or provide other statistics to characterize the threat and impact on access	Type(s) of access affected
Private residential development (including conversion of public facilities to private)	Low	Limited conversion of private lands to developments	Open Space
Non-water dependent commercial/industrial uses of the waterfront (existing or conversion)	Low	The State Coastal Zone Act restricts commercial/industrial development in a strip of land that runs along the coast of Delaware.	Coastal public access sites
Erosion	Medium	Erosion along dikes is an increased concern. Depending on location, integrity and maintenance, erosion caused by wind, waves, or water is becoming an increased threat. Beaches are under constant threat of erosion due to geological process resulting in high priced beach nourishment efforts by the State to maintain access and protection.	Dikes Freshwater impoundments, beaches, marshes.
Sea level rise	Medium	Management of sites used by public for recreational purposes (see right) are under long term threat from SLR. Decisions will have to be made regarding maintaining public access sites or retreating to allow natural migration of shoreline, where possible.	Freshwater impoundments, beaches, marshes.
Natural disasters	Low	Effect from Nor'easter and other coastal storms are temporary, generally lasting hours to days.	Coastal public access sites
National security	Low	Limited impact to access, possible for boating restrictions near fuel docks	Recreational boating
Encroachment on public land	Low	Public lands encroachment is a police matter. For DNREC holdings, Environmental Protection Officers assist in maintaining boundaries.	Open Space

The effect of sea level rise on public access within the state, as stated in previous section, is a new and emerging issue.

Public Access Availability Survey

Contextual Measure	Survey Data
Number of people that responded to a survey on recreational access	1940
Number of people surveyed that responded that public access to the coast for recreation is adequate or better.	See note*
What type of survey was conducted (i.e. phone, mail, personal interview, etc.)?	phone
What was the geographic coverage of the survey?	State wide
In what year was the survey conducted?	2008

* This specific question was not asked in the most recent survey. Coordination efforts are underway to modify the survey to obtain this information. The survey did however include question regarding recreational access. Of those surveyed, 78 % indicated the areas near their homes were easily accessible but 54% indicated that more facilities/opportunities close to home would encourage participation in outdoor recreational activities.

For the development of the State's Comprehensive Outdoor Recreation Plan, the Department of Natural Resources and Environmental Control, Division of Parks and Recreation contracts with a public opinion and attitude survey research firm that specializes in natural resource and outdoor recreation issues to design and conduct the outdoor recreation participation and trends survey. The 2008 survey included responses from residents and users of recreation facilities (90%) as well as municipalities having staffed park departments (10%). An analysis of the results show 91% of Delaware residents indicated that outdoor recreation had some importance in their lives, while 64%, a slight increase from the 2002 survey, said it was very important to them personally. These findings indicate a continued demand for outdoor recreation opportunities throughout the State. The top 5 activities participated in at public access sites within Delaware's coastal zone include: walking/jogging, visiting historic sites, swimming, cycling, and passive recreation in the outdoors. The DCP is coordinating with DNREC DPR to incorporate a direct inquiry into the adequacy of the public access availability.

In Delaware, the demand for public access continues to be high. A large net migration of people into the State of Delaware since the 1950's has made Delaware the seventh most densely populated state in the nation. By 2030, the population of Delaware is expected to be over a million people, an increase of 23% over today's population. This population growth and the resulting demand for new homes, jobs and services highlights the importance of improving the management of Delaware's land and natural resources. Nearly 50 percent of Delaware's visitors utilize coastal waters and beaches for recreational activities such as boating, fishing, sailing, sunbathing, and water skiing. Marinas and recreational boating have become increasingly popular in the state's coastal waters. There are over 90 private marinas and the largest number of registered boaters in Delaware's history was in 2008, with 56,669 boats. The Delaware Department of Natural Resources and Environmental Control's Division of Fish and Wildlife (DNREC/DFW), is the agency responsible for recreational boat activities in Delaware.

The demand for beach recreation is always high, but the state's beaches are not the only recreation and tourist sites. The state operates a system of parks, forests, and wildlife areas that constitute 70 percent of the non-federal public lands in Delaware. These parks feature miles of ocean and bay beaches, saltwater bays, dunes, and surf, and woodlands. Other activities include shell fishing, fishing, and hunting. Delaware's Seashore State Park and Fenwick Island State Park, extending south from Dewey Beach to the Maryland State line, have some of the finest ocean beach

lands on the eastern seaboard. The 33-acre Holts Landing State Park is a favorite spot for clamming, shell fishing, and family outings, along with Lums Pond State Park, which contains the state's largest freshwater lake. In order to properly manage the State's resources and educate Delaware's residents and visitors about these resources, the Delaware National Estuarine Research Reserve (DNERR) and the Coastal and Estuarine Land Protection Program are in place to provide coastal and estuarine education opportunities to all age groups and to properly manage ecologically significant coastal and estuarine areas.

Types of Public Access

Types of Public Access	**Current Number(s)**	**Changes since last assessment (+/-)**	**Cite Data Source**
(CM) Number of acres in the coastal zone that are available for public (report both the total number of acres in the coastal zone and acres available for public access)	Total land acres: 1,249,176 (as of 2007). Acres for public access: 129,930.89	This is a significant increase since the previous assessment. The increase is attributed to the development of the outdoor recreation inventory database which has centralized all public access data for the state.	Protected Lands/Outdoor Recreation Inventory (ORI)
(CM) Miles of shoreline available for public access (report both the total miles of shoreline and miles available for public access)	Total miles of shoreline: 61.45 miles. Miles open for public access: 38.96 miles	N/A	GIS "Beach Access" Data layer (Resolution 1:50,000)
Number of State/County/Local parks and number of acres	State: 16 State Parks, 9 Nature Preserves, 13 Other Sites (24,869.21), lands managed by DPR (801.61 ac); County/Local: 338 Parks (4904 ac)	Increase	DNREC Division of Parks and Recreation (DPR)
Number of public beach/shoreline access sites	~110	N/A	DNREC Shoreline and Waterway Management Section (SWMA)
Number of recreational boat (power/non-power) access sites	91	N/A	2010 Delaware Fishing Guide
Number of designated scenic vistas or overlook points	1 – Wild & Scenic River); 4 Scenic and Historic Byways (including 1 National)	Increase	Delaware Greenways
Number of State or locally designated perpendicular rights-of-way (i.e. street ends, easements)	Unlimited	No Change	

Number of fishing access points (i.e. piers, jetties)	63	Increase	2010 DE Fishing Guide
Number and miles of coastal trails/boardwalks	151 miles of Coastal Trails; 2 boardwalks	Decrease	DNREC DPR
Number of dune walkovers	44	No Change	DNREC SWMS
Percent of access sites that are ADA compliant access	Accurate data Not available		DCP is coordinating with DPR to have this information included in the (ORI)
Percent and total miles of public beaches with water quality monitoring and public closure notice programs	Coverage: 80% of Beach (17 sites, 24.5 mi) and Bay (5 sites, 25mi) shoreline Inland Bays: 14 sites, 115 mi shoreline (% not available)	Increase	DNREC Division of Water
Average number of beach mile days closed due to water quality concerns	10.5	Decrease	NRDC Report 2009; Water Quality

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

Public Access Management Efforts

Management Categories	**Employed by State (Y/N)**	**Significant changes since last assessment (Y/N)**
Statutory, regulatory, or legal system changes that affect public access	Yes	No
Acquisition programs or policies	Yes	No
Comprehensive access management planning (including GIS data or database)	Yes	Yes
Operation and maintenance programs	Yes	No
Alternative funding sources or techniques	No	No
Beach water quality monitoring and pollution source identification and remediation	Yes	No
Public access within waterfront redevelopment programs	Yes	No
Public access education and outreach	Yes	Yes

Comprehensive Access Management Planning

The Outdoor Recreational Inventory (ORI) is a database created and maintained by the DNREC Division of Parks and Recreation. The ORI contains the most complete list of protected land and public parks managed by federal, state, county, and municipal governments and school districts. With fifty-seven municipal, two county, state and federal agencies managing public lands in the state, the ORI is essential to understanding the uses and needs of recreational facilities in the state. The state funded effort is updated periodically based on information submitted by the counties and municipalities that manage park facilities and serves as an effective tool for measuring outdoor recreational uses in the state.

Public Access Education and Outreach

In 2010 the Delaware Coastal Program completed 2 regional public access guides for Delaware residents and visitors. These CZM funded guides, one for northern Delaware and one for the coastal beach region, highlight a variety of public access sites, providing details on the types of recreational activities and other amenities available at each. These publications are being made available through websites and in various park and visitor locations around the state.

Priority Needs and Information Gaps

1. What level of priority is the enhancement for the coastal zone (including, but not limited to, CZMA funding)?

   High ☐
   Medium ☐
   Low ☒

2. Will the CMP develop one or more strategies for this enhancement area?

   Yes ☐
   No ☒

No significant gaps have been identified with regard to DCP initiatives and this enhancement area. Because the state, through the DFW and DPR, has developed such a variety of coastal access possibilities in state parks, state wildlife areas, boat launch areas, natural areas and the implementation of the coastal greenways program, coastal access is not considered an area of concern within the Section 309 assessment.

Marine Debris

Section 309 Enhancement Objective
Reducing marine debris entering the Nation's coastal and ocean environment by managing uses and activities that contribute to the entry of such debris

Resource Characterization
Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

Marine Debris Characterization

Source of Marine Debris	**Extent of Source (H, M, L)**	**Type of impact** (aesthetic, resource damage, user conflicts, other)	**Significant changes since last assessment (Y/N)**
Land Based – Beach/Shore Litter	Med	Nuisance & Aesthetics	No
Land Based – Dumping	Med	Public health,	Yes
Land Based – Storm Drains and Runoff	Low	Nuisance & Aesthetics	No
Land Based – Fishing Related (e.g. fishing line, gear)	Low	Nuisance & Aesthetics	No
Ocean Based – Fishing (Derelict Fishing Gear)	Low	Nuisance & Aesthetics	No
Ocean Based – Derelict Vessels	Low	Nuisance & Aesthetics, state staff and financial resources utilized for cleanup.	No
Ocean Based – Vessel Based (cruise/cargo ship, general vessel)	Low	Nuisance & Aesthetics, no data exists characterizing volume of debris originating from this source	No
Hurricane/Storm	Low	Property damage, debris transport with storm surge, flood waters, and post storm run-off	No

Land Based Dumping

The Delaware Department of Justice and DNREC initiated legislation, enacted in 2008, to enhance Delaware's anti-dumping laws and penalties. On the heels of the new legislation, DNREC implemented the "Trashstoppers" campaign. The campaign is an outward appeal to the public for help in stopping illegal trash dumping along Delaware roadways. Trash left behind by illegal dumping is harmful to public health, mars and pollutes the landscape, and destroys the state's natural beauty. It is also costly in cleaning up, and the public inevitably bears the brunt of those costs. The public is encouraged to notify DNREC about any roadways or streets used for illegal dumping so the sites can be put under surveillance by digital cameras now effectively used for identifying trash dumpers. The public may also be asked to identify the trash dumpers who are caught in the act in photos to be posted on the DNREC web site. Using the cameras for obtaining convictions is a strong deterrent against trash-dumping and the Attorney General's Office was instrumental in amending the dumping law to make the registered owner of a vehicle involved in a dumping offense liable to prosecution. DNREC's Environmental Protection Officers (EPOs) investigated 1,744 complaints in

the first six months of 2010 – covering a wide range of violations and emergencies of Delaware's air, land and water that threatened public health, safety and the environment.

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

Marine Debris Management Characterization

Management Categories	Employed by State (Y/N)	Employed by local Governments (Y/N/Unknown)	Significant changes since last assessment (Y/N)
Recycling requirements	Yes	Yes	Yes
Littering reduction programs	No	Unknown	No
Wasteful packaging reduction programs	No	Unknown	No
Fishing gear management programs	Yes	Unknown	No
Marine debris concerns in harbor, port, marine, & waste management plans		Unknown	No
Post-storm related debris programs or policies	No	No	No
Derelict vessel removal programs or policies	Yes	Unknown	No
Research and monitoring	No	No	No
Marine debris education & outreach	Yes	Unknown	No

Universal Recycling Legislation

In the spring of 2010, Delaware's Governor signed into law a bill a universal curbside recycling program. Senate Bill 234 will eliminate the state's bottle deposit program, reducing the former fee of 5 cents on all beer and soda cans to 4 cents per individual container. This fee is intended to provide the startup money for the recycling program and will continue from Dec. 1, 2010 to Dec. 1, 2014 wherein it will expire after raising an estimated $22 million in startup funds.

While individuals will not be required to participate in this recycling program, commercial customers will be required to participate. Waste collection providers will be mandated by law to offer these curbside recycling services to their residential customers by 2013 and to their commercial customers by 2014. The Department of Natural Resources and Environmental Control will also provide grants to municipalities in control of their own trash collection as well as to private waste hauling businesses. This is intended to balance the costs involved in increasing the amount of trucks and bins that will be necessary to make this universal recycling program a success.

Enhancement Area Prioritization

1. What level of priority is the enhancement for the coastal zone (including, but not limited to, CZMA funding)?

   High ☐
   Medium ☐
   Low ☒

2. Will the CMP develop one or more strategies for this enhancement area?

Yes ☐
No ☒

No gaps have been identified with regard to Delaware Coastal Programs' initiatives and this enhancement area. Considering Delaware's successful programs for reduction of solid waste; the favorable results in the apprehension of solid waste violators, repeated high turnouts for beach clean-ups; and the low numbers of commercial vessels and low abundance of associated debris due to the types of collection equipment, the state does not have a major problem with marine debris.

Cumulative and Secondary Impacts

Section 309 Enhancement Objective

Development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources.

Resource Characterization

Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

Cumulative and Secondary Impacts

Geographic Areas/Sensitive Resources	**Rate of Growth or Level of Threat (**% Δ; H, M, L)	**Types of CSI**
Coastal Shoreline	Increased, High Threat	Development, recreational boating and tourism impacts resulting in fragmentation of habitat, loss or degradation of wetlands. Increased risk to coastal hazards.
Inland Bays	Increased Medium Threat	Development, recreational boating and tourism impacts resulting in fragmentation of habitat, loss or degradation of wetlands, water pollution.
Delaware Estuary	Increased, High Threat	Dredging, development, impacts resulting in fragmentation of habitat, loss or degradation of wetlands, recreational boating, tourism and related impacts to benthic communities/fisheries. Increased risk to coastal hazards.
Coastal Watersheds	Increased Medium Threat	Development, recreational boating and tourism impacts resulting in fragmentation of habitat, loss or degradation of wetlands, water pollution.

Preliminary Land Use Service

The State's Preliminary Land Use Service (PLUS) process, which involves reviews by all applicable state agencies at the start of the land development process, continues to be implemented within the state. This process adds knowledge to the permit review process without taking over the authority of local governments to make land use decisions. Land use change proposals are submitted to state agencies through the Office of State Planning Coordination and are the subject of monthly PLUS meetings, at which applicants meet with state agency resource experts to discuss their plans and identify possible problems, and solutions. DNREC provides comments pertinent to cumulative and secondary impacts including wetland protection, impervious surface, habitat fragmentation and open space management along with other issues specific to programs within the agency. However, many go the comments are advisory, not regulatory requirements.

Technical Assistance Grants

The DCP has continues to implement its Community Assistance Grant Program to improve local and regional capacity to conserve, manage, and promote the incorporation of coastal management issues into local planning and implementation activities throughout Delaware. Through this program the DCP has worked with communities to develop open space management plans which, through

reforestation and/or the establishment of meadow habitat, has increased biodiversity and restored and enhanced wildlife habitat, controlled invasive species, reduced nutrient input, reduced water run-off by increasing water infiltration areas and established buffers along sensitive waterways in the state. Through this and other coordinated efforts, over 600 acres of coastal forest and meadow habitat were created or restored in recent years. The DCP has also assisted communities in the development of ordinances for incorporation into Municipal Comprehensive Plans that, through restricted zoning and planning design standards for future development, address environmental factors, including the protection and preservation of open spaces, water resources, recharge areas, and well-head regions. And, as awareness of the need grows, this grant program is now focusing on activities and planning efforts that assist sea level rise adaptation planning, the reduction of coastal hazard related impacts, increasing local or regional coastal resiliency and/or natural resource management issues.

CELCP

The Coastal and Estuarine Land Protection Program (CELCP), designed to protect ecologically important habitat within the Coastal Zone, has been used successfully by Delaware in the identification of ecologically significant coastal and estuarine areas that are under threat of conversion. Primarily protection efforts have been focused on the watersheds containing the two components of the Delaware National Estuarine Research Reserve (DNERR). Of note, large tracts of land have acquired in the area surrounding the Blackbird Creek Reserve. The acquisition of these properties has enabled the State to create and protect corridors of open space, reducing the fragmentation of habitat and reducing development and sprawl within this ecologically important watershed. Additionally, this provides area residents and visitors with additional open space for recreation and increased education and awareness through activities presented by DNERR staff. Staff from the Delaware Coastal Programs will incorporate comments received by NOAA to finalize the State of Delaware's Draft Coastal and Estuarine Land Protection Plan.

Nonpoint Source Pollution

A statewide collaborative effort to control coastal nonpoint pollution, lead by the Non-Point Source Program (319) aids in reducing the cumulative and secondary impacts of NPS through the implementation of innovative projects across the state as well as aiding with the implementation of TMDLs in targeted watersheds through the development and promulgation of Pollution Control Strategies. Under Section 319 of the Clean Water Act, States, Territories, and Indian Tribes receive grant money which support a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects.

The town of Townsend recently became the first community in Delaware and only the 40th in the country to be certified as a Community Wildlife Habitat. The town, along with DNREC's Watershed Assessment Section, the Appoquinimink River Association, and the Delaware Nature Society were founding partners of the habitat project. A Community Wildlife Habitat is a community that provides habitat for wildlife throughout the community – in individual backyards, on school grounds and in public areas such as parks, community gardens, places of worship and businesses. The certified community is a place where the residents make it a priority to provide habitat for wildlife by providing the four basic elements that all wildlife need: food, water, cover and places to raise young. Over the last three years, the project took on many facets, including the creation and certification of 24 residential homes as backyard wildlife habitats with partial funding from DNREC's 319 Grant Program.

In 2008, Delaware announced the adoption of regulations designed to reduce the amounts of nitrogen and phosphorus entering the Inland Bays and their tributaries to levels required to meet water

quality standards for the Indian River and Bay, Rehoboth Bay and Little Assawoman Bay Watersheds. Delaware's Inland Bays are recognized as waters of exceptional recreational and ecological significance. In 1998, the Inland Bays Tributary Action Team, a group of stakeholders representing citizens, businesses, organizations and government, was formed to develop a pollution control strategy. In 1998 and 2004, DNREC completed total maximum daily loads (TMDLs) for nutrients for the Inland Bays. TMDLs establish the maximum amount of individual pollutants that can be discharged to a water body from point (direct) or nonpoint (indirect) sources while maintaining water quality standards.

As part of the Pollution Control Strategy for the Inland Bays, the TMDLs for the Inland Bays established that nonpoint sources of nitrogen and phosphorus need to be reduced by 40 to 85 percent to bring the water quality to the level sufficient to protect human health and support aquatic life. The strategy includes provisions to establish buffers in developments and subdivisions to filter pollutants before they flow into the Inland Bays and their tributaries. Primary waters, including the Inland Bays and tributaries with continual stream flow and state-regulated wetlands, require buffer widths of 100 feet, while secondary waters, including bay tributaries with intermittent streamflow, require 60-foot buffers. Buffer widths may be reduced to 50 feet on primary waters and 30 feet on secondary waters with enhanced stormwater management and a development-wide nutrient management plan.

The strategy also requires pump-out and inspection of onsite wastewater treatment and disposal systems (septic systems) that serve homes and businesses which are sold or transferred to other owners. In addition, advanced treatment for nitrogen reduction is required for all new and replacement onsite wastewater and disposal systems on properties located within 1,000 feet of tidal waters and wetlands, as mapped in the proposed regulation. All new and replacement systems would be required to use this technology by 2015.

Federal Activities Coordination

The Delaware Department of Natural Resources and Environmental Control (DNREC) is currently evaluating a Wetlands and Subaqueous Lands permit application for the deepening of the Delaware River navigation channel from 40 feet to 45 feet to accommodate deeper draft vessels. This project, known as the Main Channel Deepening, is a proposal from the U.S. Army Corps of Engineers in conjunction with the Philadelphia Regional Port Authority. The project was originally proposed over a decade ago but deepening did not proceed until October 2009 (without state permits-litigation is pending). The Delaware Coastal Programs granted federal consistency on the original permit submittal in 1997 subject to several conditions and on the assumption that outstanding environmental concerns would be addressed through the state permit process. However, the Wetlands and Subaqueous Lands permits were not issued by DNREC at that time and after a 2001 public hearing, the presiding hearing officer recommended denial of the state permits. DNREC denied the permits in 2009 and the Army Corps submitted a new and substantially revised permit application in March 2010. The DCP sought to review the new application under the supplemental consistency provisions of the federal consistency regulations, but the Army Corps has declined to comply.

Although the DCP is not currently reviewing the action for supplemental consistency, staff are actively involved in the state permit review process. The DCP is providing input on all aspects of the project, has collected core samples and conducted benthic surveys of portions of the Main Channel for comparison to Army Corps sediment characterization data. Analysis is currently underway. Dredged material from specific portions of the channel are slated for two beneficial reuse projects in Delaware - a beach replenishment project at Broadkill Beach in Sussex County and a wetland creation (confined disposal facility) at Kelly Island in Kent County. Appropriate grain size is paramount to the

success of these projects, both from design stability and habitat suitability standpoints. The DCP has significant concerns with the accuracy of the Army Corps data and questions the purported benefit of the two dredge disposal projects. Other environmental concerns and economic issues are also being evaluated by the DCP.

The State of Delaware, like many of its neighboring states in the Eastern U.S., is promoting the development of offshore wind energy as a way to stimulate the job market and meet aggressive renewable energy portfolio standards. As such, there are several proposals to develop wind turbines offshore in both State and Federal waters. The Bureau of Ocean Resource Management (BOEM, formerly Minerals Management Service) recently issued and received two responses to a Request for Interest (RFI) for areas within Federal waters off the coast of Delaware; the University of Delaware has signed agreements with the National Renewable Energy Lab (NREL) to develop test turbines in State waters. Due to the Federal permitting process for both locations, the Delaware Coastal Programs, through implementation of the Coastal Zone Federal Consistency Certification process, will be leading coordination of the Department's response to these proposals and others.

In addition to issuing federal consistency certifications and coordinating permit processes, the Delaware Coastal Programs is working through several regional and federal committees to improve future alternative energy siting and improve the effectiveness of permitting process. As discussed in other sections of this document, the Mid-Atlantic Regional Council on the Ocean (MARCO) is bringing together five states to work on priority regional ocean governance issues, one of which is offshore renewable energy. Delaware has the lead on this issue and is pursuing projects that assess permitting effectiveness. In addition to MARCO, staff from the Delaware Coastal Programs have also been involved in the development and initiation of the BOEM Offshore Energy Task Force for Delaware and the Atlantic Wind Energy Consortium. The BOEM Offshore Energy Task Force was established by BOEM in 2009 and consists of state and federal stakeholders. Its purpose is to help inform BOEM decision making about offshore energy development. Since its initiation there have been only two meetings, but it is anticipated that the frequency and content of these meetings will increase as proposed projects come closer to fruition. The Atlantic Wind Energy Consortium is also led by BOEM, but is comprised of stakeholders from most Atlantic States. Three workgroups have provided recommendations in the areas of Science and Data, Investment and Infrastructure and Permitting and Regulations. Delaware Coastal Programs staff served on the Science and Data and Permitting and Regulations subgroups.

The Delaware Coastal Programs remains committed to coordinating offshore wind energy development with its partners and creating opportunities for regional projects and partnership. DCP staff will continue to serve on all three of the committees above and will continue to lead the State's response to offshore energy development pressures.

Priority Needs and Information Gaps

Gap or need description	**Type of gap or need** (regulatory, policy, data, training, capacity, communication & outreach)	**Level of priority (H,M,L)**
Increase in Education/Awareness	communication & outreach	High
Increased cooperation by federal agencies	Regulatory	Medium

In Delaware, the increase in population and concurrent demand for housing and support services present a significant challenge to state, county, and local planning offices. This is particularly true for local governments that are charged with the ultimate zoning and land use decisions statewide. Although the DCP has a plethora of policies related to land use, only those related to Industrial Development in the Coastal Strip, Wetlands, Beaches & Shoreline Protection, Coastal Waters, and

Subaqueous lands have enforceable authority at the state level. The DCP believes the most effective way to assist implementation of coastal resource policies related to the cumulative & secondary impacts of development in Delaware is to provide local government with effective tools to rapidly assess and consider resources at risk as an integral part of making land use decisions. This will also help local government identify necessary refinements to ordinances.

Enhancement Area Prioritization

Cumulative and Secondary Impacts continue to evolve as conflicting uses such as energy siting, shipping, recreational and commercial fishing all vie for priority use of the same limited coastal areas. Due to the complexity of the potential impacts of these conflicting using which may not fully be understood, will be addressed through a marine spatial planning project being developed in the Ocean Resources assessment area.

1. What level of priority is the enhancement for the coastal zone (including, but not limited to, CZMA funding)?

   High ☐
   Medium ☒
   Low ☐

2. Will the CMP develop one or more strategies for this enhancement area?

   Yes ☒
   No ☐

With a medium priority rating, the DCP will continue to assist communities and coastal managers by providing technical assistance for decision making including information dissemination for the development of coastal management plans, particularly those focusing on adapting to sea level rise and resiliency/vulnerability assessments, and for the development of ordinances to improve land use decision making by local governments. This will be done through most 306 tasks, but primarily though program administration and sustainable community support.

Special Area Management Planning

Section 309 Enhancement Objective

Preparing and implementing special area management plans for important coastal areas

The Coastal Zone Management Act (CZMA) defines a Special Area Management Plan (SAMP) as "a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of policies; standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographic areas within the coastal zone. In addition, SAMPs provide for increased specificity in protecting natural resources, reasonable coastal-dependent economic growth, improved protection of life and property in hazardous areas, including those areas likely to be affected by land subsidence, sea level rise, or fluctuating water levels of the Great Lakes, and improved predictability in governmental decision making."

Resource Characterization

Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

Geographic Area	**Major Conflicts**	**Is this an emerging or a long-standing conflict?**
Ocean /Coastal areas	Marine Spatial Planning	Emerging

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

SAMP Title	**Status** (new, revised, or in progress)
South Wilmington Area SAMP	Complete
Regional Sediment Management	Revised

The 2005 Delaware Coastal Programs Enhancement Strategy identified the South Wilmington Area for Special Area Management Planning to revitalize the waterfront and the adjacent neighborhood of Southbridge. This area was targeted for a SAMP due to the complex interactions between waterfront urban revitalization, an environmental justice community and a legacy of environmental contamination.

The South Wilmington SAMP Core Management Group, comprised of local, county and state government agencies, developers, citizens and non-profit service providers, identified necessary steps to build capacity and implement the SAMP including Development of a Neighborhood Plan; A Comprehensive Review of Legal Authorities; Development of an Environmental and Ecological Characterization and Enhancement Plan; Development of a Non-Residential Area Sustainable Economic Development Plan; Development of a Stormwater and Flood Relief Plan; and Public Outreach and Public Participation.

The development of these planning and guidance documents set the stage for an incredible amount of on-the-ground work that has included youth employment programs, job training programs,

major sewer and drainage system improvements, transportation enhancements, housing rehabilitation, economic development programs and business assistance, creation of community benefit agreements with developers and community beautification projects. Most importantly however, the SAMP provided a venue to build trust between project partners and built capacity in the community to achieve the vision that they created for themselves.

The responsibility of implementing the results and recommendations of the SAMP has been taken over by the Southbridge Coordination Group (comprised of community leaders and elected officials) and the City of Wilmington. Other project partners, such as the Wilmington Metropolitan Planning Council, have embedded SAMP goals and recommended projects into their multi-year plans and are actively pursuing on-the-ground implementation projects, in coordination with the residents of the neighborhood.

Regional Sediment Management

The DCP also reviewed the utility of using a SAMP to coordinate the complex issues associated with the development of regional sediment management (RSM) strategies in the Delaware Inland Bays, Atlantic Coast, and Lower Delaware Bay. As discussed in the Section II of this document, as coordination efforts began moving forward, it became apparent that other agencies and non-profit organizations were undertaking similar planning efforts and it was determined that the DCPs efforts would be duplicative. However, if the efforts put forth by these other state and federal agencies fail to assist in the management of long-term economic and ecologic implications for sediment management activities, the DCP may reevaluate the need to further coordinate RSM efforts.

Enhancement Area Prioritization

At the medium priority level, the Delaware Coastal Program is evaluating the utility of implementing a SAMP as an administrative tool for coastal marine spatial planning. Please refer to the Ocean Resources Section for further discussion.

1. What level of priority is the enhancement for the coastal zone (including, but not limited to, CZMA funding)?

   High ☐
   Medium ☒
   Low ☐

2. Will the CMP develop one or more strategies for this enhancement area?

   Yes ☐
   No ☒

Ocean Resources

Section 309 Enhancement Objective
Planning for the use of ocean resources

Resource Characterization
Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

Ocean Resource Characterization

Resource/Use/Issue (Topic Area)	Threat or Use Conflict or Actions	Degree of Threat (H, M, L)
Climate Change	Sea level rise, increased coastal hazards; address vulnerabilities and identify mechanisms to reduce impacts	High
Habitat Protection	Environmental resource impacts; regional protection and restoration efforts; oil spills; dredging/trawling	High
Energy Development	Environmental resource impacts - marine spatial planning	High
Water Quality	Environmental resource impacts -wastewater infrastructure; marine debris; oil spills	High
Other Resources	Sand Stock for Beach Replenishment; recreational uses	Moderate

Delaware residents and out-of-state visitors have always enjoyed the State' bountiful bays and beaches and the many opportunities they offer for aesthetic enjoyment, recreation, and economic benefit. The resources found in the State's oceanic waters are precious. Analysis of these uses and resources reveal that a number of conflicts exist. Some of the major ocean resources and uses that take place offshore Delaware include: commercial and recreational fisheries; marine mammal protection; whale and dolphin watching; maritime transportation (including issues related to dredging and port infrastructure); potential exploitation of offshore oil and gas resources; and current exploitation of offshore sand resources for beach nourishment. They also serve as a site for recreational boating, communication links between continents, potential siting for wind farms, and contribute as well to our national security through activities of our military forces. Typically, however, citizens and public officials pay less attention to the ocean lying off shore the beaches and bays unless a crisis arises.

Mid-Atlantic Regional Council on the Ocean

Delaware's resources from the ocean, estuaries, and submarine floor have played a vital role in the support of society for tens of thousands of years. Properly managed, ocean resources will continue to provide this support; improperly managed, certain resources could be lost forever. These issues transcend state boundaries making it necessary to use a regional approach to effectively manage our assets (as recommended by the Pew Oceans Commission and the U.S. Commission on Ocean Policy). This constitutes a need to protect shared resources while complimenting strides being made by individual states. As such, the Delaware Coastal Programs is leading a five-state regional initiative to develop and implement the Governor's Initiative on Ocean and Coastal Conservation.

In June 2009 the Governors of Delaware, Maryland, New Jersey, New York, and Virginia convened a summit to mark the signing of the Mid-Atlantic Governors' Agreement on Ocean Conservation and the

establishment of the Mid-Atlantic Regional Council on the Ocean (MARCO). Discussions held at the Governors Summit built on expert knowledge and led to the identification of initial actions that advance each of the Governors' four shared priorities. Under the MARCO umbrella the five states are working together to address the four priority issue areas which include: protection of sensitive and unique offshore habitat areas; support for the sustainable development of offshore renewable energy; prepare the region's coastal communities for the impacts of climate change on ocean and coastal resources; and promote improvements in the region's coastal water quality. MARCO has recently added a fifth priority to address coastal and marine spatial planning (CMSP) in light of the President's Ocean Policy Task Force recommendations to develop a national framework for CMSP. CMSP is seen by MARCO as a means to advance most, if not all, of the four priorities and each state is taking steps to aid in the development, coordination, and integration of coastal and marine spatial plans for the region.

The Governors Agreement also called for MARCO to hold a Stakeholder Workshop on the initial action plan. In December 2009, key state and federal agency representatives along with high-profile leaders of the full range of ocean interests learned from each other, deliberated, and made commitments to advancing MARCO's shared actions on its priority areas. Based on the valuable feedback and dialogue from the stakeholder workshop, MARCO is collaborating with federal partners to implement the priority actions and is drafting an updated action plan. The DCP hosted two two-day MARCO working meetings in May and August 2010 to further the state-federal partnerships and the updated action plan.

The DCP has taken various steps towards understanding, assessing, and formulating strategies in each of the priority areas. DCP is the lead on addressing MARCO's goal of preparing the region for sea level rise impacts on regional infrastructure, coastal habitat, and shoreline management. In preparation for sea level rise, the state has completed LiDAR mapping for its entire coast and is working on parallel tracks to model sea level rise risks to all coastal communities and prepare a Sea Level Rise Adaptation Plan. The state has conducted preliminary training for coastal community leaders about coastal resilience, and has launched a concerted initiative targeting local communities throughout the development and implementation of the Plan. DCP will use these steps and experience to guide and formulate the development of vulnerability assessments and sea level rise scenarios for the MARCO region and to promote regional information exchange about adaptation across the states.

DCP is highly involved in supporting the sustainable development of renewable energy in the offshore areas of Delaware and the Mid-Atlantic. Delaware is poised to be the first state in the nation with commercial offshore wind development. In September 2010, DCP entered into a contract with the Environmental Law Institute to examine and define regulatory steps and timeframes and identify potential barriers to the development of offshore renewable energy in Delaware waters. Delaware and the other MARCO states are also participating in the Atlantic Offshore Wind Energy Consortium and exploring the use of that forum as a means to leverage greater federal investment in research related to migratory pathways and potential impacts of wind energy development in the region.

Priority Needs and Information Gaps

Gap or need description	**Type of gap or need** (regulatory, policy, data, training, capacity, communication & outreach)	**Level of priority (H,M,L)**
Develop and implement a stakeholder engagement framework for CMSP	Communication & Outreach	High
Develop planning tools, guidance, design guidelines, and training materials for CMSP decision-making	Data, Policy, Capacity	High

Develop new or enhanced decision-support tools for the MARCO GIS Portal	Data, Training	High
Develop a regional aquatic habitat protection strategy	Data, Policy, Regulatory	High
Develop regional survey and monitoring protocols for offshore wind development	Data	High
Develop regional siting criteria for offshore wind development	Data, Policy, Regulatory	High
Conduct a regional review of energy policies, regulations, and programs for offshore renewable energy	Policy, Regulatory	High
Conduct regional sea level rise vulnerability assessments	Data, Capacity, Training	High
Develop a consistent communications and messaging strategy on climate change impacts	Communication & Outreach	High

Enhancement Area Prioritization

The importance of ocean resource management has continued to rise in recent years. With the increasing demands for commercial use and the necessity to protect vital marine habitat, the management of ocean resources ranks as a high priority for the DCP. A specific strategy will be developed for this enhancement area building upon the efforts of MARCO, culminating in a marine management plan for Delaware's Atlantic Ocean Area.

1. What level of priority is the enhancement for the coastal zone (including, but not limited to, CZMA funding)?

   High ☒
   Medium ☐
   Low ☐

   Briefly explain the level of priority given for this enhancement area.

2. Will the CMP develop one or more strategies for this enhancement area?

   Yes ☒
   No ☐

   Briefly explain why a strategy will or will not be developed for this enhancement area.

Energy & Government Facility Siting

Section 309 Enhancement Objectives

Adoption of procedures and enforceable policies to help facilitate the siting of energy facilities and Government facilities and energy-related activities and Government activities which may be of greater than local significance

Resource Characterization

Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

Type of Energy Facility	Exists in CZ (# or Y/N)	Proposed in CZ (# or Y/N)	Interest in CZ (# or Y/N)	Significant changes since last assessment (Y/N)
Oil / Gas Facilities	Yes	No	Yes	No
Pipelines	Yes		Yes	No
Electric Transmission Cables	Yes	Yes	Yes	No
LNG	No	Yes, but denied	No	No
Wind	No	Yes	Yes	No*
Wave	No	No	No	No
Tidal	No	No	No	No
Current	No	No	Yes	No*
OTEC	No	No	No	No
Solar	Yes	Yes	Yes	No

* A number of customer-sited alternate energy systems have been established. However, larger systems for higher capacity power generation have not been permitted.

Resources

Sustainable Energy Utility

Delaware felt the burden of unsustainable energy, mostly from fossil fuels – coal, oil, and natural gas, in 2006 when electricity prices in the State increased by nearly 60 percent. At the same time, world petroleum prices tripled to over $70 per barrel, driving up the costs of gasoline, diesel fuel, heating oil and propane. As supplies of fossil fuels decline and prices rise and become more volatile, and as the environmental problems associated with these fuels become evident, the economic and environmental unsustainability of our current energy system is increasingly revealed. In June 2006, the Delaware General Assembly passed Senate Concurrent Resolution No. 45, creating the Sustainable Energy Utility (SEU) Task Force. The purpose of the SEU Task Force is to conduct analyses leading to a policy agenda for a sustainable energy utility for the State.

The key feature of the SEU Task Force's approach was its organization of a competing utility to harness cost-effective, end-use energy efficiency and conservation options and customer-sited renewable energy applications across all sectors and fuels, including transportation. This was a major departure from conventional approaches addressing specific segments of the supply infrastructure or limited "silos" of end users. The SEU Task Force captured these alternatives by enabling and funding a competitive utility to cover the full incremental costs between standard and high-efficiency technologies and standard fuel services and those provided by distributed renewable energy applications.

Energy efficiency and renewable energy have traditionally been associated with program-based education and incentives administered through utilities or government agencies. Programs of this type are driven by regulatory mandates, and focus mainly on regulated electricity and natural gas services. Programs distribute funds collected from utility ratepayers in the form of system benefit charges (SBCs) or other sources. Programs administered by utilities and government agencies accomplish a measure of efficiency improvements largely based on the amount of public funds given them. But incentives to respond to market pressure and to create sustainable energy businesses are not included and experience to date is that these develop haphazardly, if at all. In fact, for utilities there are often inherent conflicts with energy efficiency and customer-sited renewables.

The most important feature of the SEU is that energy users can build a relationship with a single organization whose direct interest is to help residents and businesses use less energy and generate their own energy cleanly. Directly put, the SEU becomes the point-of-contact for efficiency and self-generation in the same way that conventional utilities are the point-of-contact for energy supply.

As part of its toolkit, the SEU will also use incentive funds to encourage whole-building strategies to improve energy performance. Its Green Building Initiative will work with architects and building developers to identify special projects that merit SEU investment. This program will likewise observe a 30% energy savings goal, which is consistent with the 2030 Challenge adopted by the American Institute of Architects.

The second Energy Efficiency Goal focuses on the need for affordable energy for low and moderate income households. Energy costs for low income households account for a much larger proportion of household income than for others. Low income renters and homeowners also reside in homes that consume significantly more energy per square foot than other housing. At the same time, there is a backlog of about five years for low income consumers eligible for weatherization projects to improve home energy efficiency. The rate of low income household weatherization should be doubled to address this backlog and increase home energy efficiency.

The SEU will assist Delaware households and businesses in installing at least 300 MW of customer-sited renewable energy by 2019 through the use of incentives and other policy measures. These renewable energy systems will include at least 100 MW of solar photovoltaics and at least 200 MW of solar thermal, wind, geothermal, and other renewable resources.

LNG

A liquefied natural gas facility (LNG), originally proposed in New Jersey with a portion of the facility extending into Delaware's coastal zone, was denied its necessary Delaware Coastal Zone Act Permit. New Jersey challenged Delaware's decision in the US Supreme Court, particularly our right to deny a pier in Delaware waters for the bulk transport of LNG in New Jersey. A Special Master was assigned and heard the case on Feb 22 2007. The Special Master ruled against New Jersey, and recommended that the full court consider that Delaware rightfully executed their authority.

Wind

With the authorized by Section 388 of the Energy Policy Act of 2005, relating to the development of the alternative energy and alternate use program on the Outer Continental Shelf (OCS), DNREC officials and Bluewater Wind (BWW) began discussions regarding the development of a wind energy farm on the OCS off the shores of Delaware. While the need for renewable energy is becoming more important, the State must also consider the impact of these projects on its natural resources.
In June 2008, a utility provider signed a 25-year power purchase agreement with BWW for a minimum of 200 megawatts of capacity (with the option to sell up to 600 MW total). The proposed design increases the potential detrimental effects to some of the State's living resources, particularly migratory birds, which are of international concern, and the local fisheries. Specifically, issues raised concerning the wind farm included its placement in the flight path of migratory species, some of which are considered threatened or endangered by the State and that its proposed location was situated over future borrow sites,

potentially reducing that mineral resource to the State. BWW is currently studying coastal effects to better understand the potential impacts the wind farm would have on Delaware's coastal resources in order to obtain the necessary permits to proceed with a wind energy project off Delaware's Atlantic coast line. The offshore wind farm will be sited 11.5 miles offshore Rehoboth Beach, Delaware and, pending permitting, is expected to come online between 2012 and 2015; the permitting process and attendant environmental study process have been launched.

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

The DCP has enforceable policies relating to energy facilities. Several policies based on the Delaware Coastal Zone Act of (DCZA) 1971, (Title 7, Chapter 70), which controls the location, extent, and type of industrial development in Delaware's environmentally sensitive Coastal Zone. The Act specifically states that the coastal areas of Delaware are the most critical areas for the future of the State in terms of the quality of life. The State of Delaware, through the DCZA, prohibits any new heavy industry use in the coastal zone. Any proposed new energy facilities that would undertake a refining process are strictly prohibited in the coastal zone. Moreover, bulk product transfer facilities (such as refinery pipelines) are also prohibited, and ship to ship transfer activities is likewise prohibited. On the other hand, electric power plants are allowed within the coastal zone by permit only since they do not refine or manufacture "fuels", but rather are considered a "conversion" use of a fuel into electricity. While alternative fuels are recommended due to safety concerns and waste disposal issues, nuclear power generation facilities are permitted. And, offshore development for alternative energy, and oil and gas exploration are permitted provided such activities do not result in the degradation of Delaware's natural resources.

Energy Facility Management Characterization

Management Categories	**Employed by State (Y/N)**	**Significant changes since last assessment (Y/N)**
Statutes or regulations	Yes	No
Policies	Yes	No
Program Guidance	No	No
Comprehensive siting plan (including SAMPs)	No	No
Mapping or GIS	Yes	No
Research, assessment or monitoring	Yes	No
Education and outreach	No	No

Priority Needs and Information Gaps

Gap or need description	**Type of gap or need** (regulatory, policy, data, training, capacity, communication & outreach)	**Level of priority (H,M,L)**
Resource Impact Analysis	Data	Medium
Renewable Energy Siting	Policy, Capacity, Regulatory	Medium

Enhancement Area Prioritization

Renewable energy exploration, development, and generation in the waters over the Mid-Atlantic outer continental shelf present challenges and opportunities for the State. Delaware is giving this enhancement area a medium priority ranking for this assessment period but is anticipating an increased interest in offshore renewable energy development activities. In preparation for such an increase, Delaware is conducting a review of current the regulations and policies applicable to energy facility siting off the coast of Delaware to identify barriers or opportunities in this area, and to identify where modifications or additional policies may be useful to address its needs. The DCP will not develop a strategy solely to address energy facility siting but will undertake this issue through its coastal marine spatial planning efforts within the ocean resources enhancement area.

1. What level of priority is the enhancement for the coastal zone (including, but not limited to, CZMA funding)?

   High ☐
   Medium ☒
   Low ☐

2. Will the CMP develop one or more strategies for this enhancement area?

   Yes ☒
   No ☐

Aquaculture

Section 309 Enhancement Objective

Adoption of procedures and policies to evaluate and facilitate the siting of public and private aquaculture facilities in the coastal zone, which will enable States to formulate, administer, and implement strategic plans for marine aquaculture

Resource Characterization

Aquaculture facilities currently operating in Delaware.

Type of Existing Aquaculture Facility	Describe Real Trends	Describe associated impacts or use conflicts
Commercial; Live Market Tilapia	Overall, Delaware hosts a small number of commercial aquaculture producers, and the number of commercial and research facilities has not increased within the last five years. Research of oysters and hard clams is ongoing. In general, interest in aquaculture is increasing within the State of Delaware.	Water quality impacts resulting from aquaculture operations are regulated by Delaware Water Quality Standards and Surface Water Discharges Programs
Commercial; domestic and international production of eggs, fry, and fingerlings of a variety of finfish and pond stocking species		
Research; Oyster and hard clam production		

Aquaculture production in Delaware is limited in terms of commercial producers, though there are a small number of individuals involved with the industry. The largest single producer in the State is growing tilapia for the live market and is currently the only farm in production in this sector. Another established company specializes in the production of eggs, fry, and fingerlings of hybrid and straight striped bass and yellow perch for domestic and international markets and distributes a variety of other cultured and wild finfish species. In addition to this operation, there are individuals involved with smaller scale production and distribution of various pond stocking species, American eel and crab peeling (shedding) operations. Delaware currently has no commercial shellfish or marine aquaculture, but oyster and hard clam aquaculture is part of a shellfish research, restoration, and demonstration program being conducted by the Delaware Center for the Inland Bays (CIB) with technical assistance from the Delaware Sea Grant Marine Advisory Service and Delaware State University. Also, the Delaware Bay Oyster Restoration Task Force has a program to revitalize the oyster population in the Delaware Bay.

Despite the small size of the current industry there is increasing interest in aquaculture as an alternative to, and as a means of diversification from traditional agriculture production. Research and demonstration efforts with appropriate fish and shellfish species that can be raised in an environmentally sustainable and economically viable way in Delaware are facilitating this trend.

The Delaware Aquaculture Act enacted in 1990 designates the Delaware Department of Agriculture as the lead agency for aquaculture development in the State. The Department has proposed a series of regulations pertaining to aquaculture in non-tidal waters that have not been formalized. No specific regulations exist for aquaculture in tidal waters.

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

Aquaculture Management Efforts

Management Categories	Employed by State (Y/N)	Significant changes since last assessment (Y/N)
Aquaculture regulations	No	No
Aquaculture policies	No	No
Aquaculture guidance	No	No
Research, assessment, monitoring	Yes	No
Mapping	No	No
Aquaculture education & outreach	No	No

Priority Needs and Information Gaps

Using the table below, identify major gaps or needs (regulatory, policy, data, training, capacity, communication and outreach) in addressing each of the enhancement area objectives that could be addressed through the CMP and partners (not limited to those items to be addressed through the Section 309 Strategy). If necessary, additional narrative can be provided below to describe major gaps or needs.

Gap or need description	Type of gap or need (regulatory, policy, data, training, capacity, communication & outreach)	Level of priority (H,M,L)
Aquaculture Regulations	Regulations	L

The Delaware Aquaculture Act was signed into law in 1990 designating the Department of Agriculture the lead agency for promoting and coordinating aquaculture in Delaware. The legislation also authorized creation of the aquaculture advisory council. There have been no amendments to the State's aquaculture act or implementation of regulations since the last assessment. Without regulatory or permitting programs for aquaculture in Delaware, it is difficult for this assessment area to expand in the State. With the current lack of demand for new facilities, other projects rank higher in priority than this issue.

Enhancement Area Prioritization

1. What level of priority is the enhancement for the coastal zone (including, but not limited to, CZMA funding)?

   High ☐
   Medium ☐
   Low ☒

2. Will the CMP develop one or more strategies for this enhancement area?

   Yes ☐
   No ☒

The last assessment listed aquaculture as a low priority due to minimum active industry. Delaware Coastal Programs will work in conjunction with and assist the Department of Agriculture if future issues should arise in regards to aquaculture activities and the potential impacts to the coastal zone at which point the priority level of this topic will be increased.

IV. Strategy

Issue Area(s)

The proposed strategy or implementation activities will support the following priority (high or medium) enhancement area(s) *(check all that apply)*:

- ☐ Aquaculture
- ☒ Energy & Government Facility Siting
- ☒ Coastal Hazards
- ☒ Ocean/Great Lakes Resources
- ☐ Special Area Management Planning
- ☒ Cumulative and Secondary Impacts
- ☐ Wetlands
- ☐ Marine Debris
- ☐ Public Access

Program Change Description

A. The proposed strategy will result in, or implement, the following type(s) of program changes *(check all that apply):*

- ☐ A change to coastal zone boundaries;
- ☒ New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;
- ☐ New or revised local coastal programs and implementing ordinances;
- ☐ New or revised coastal land acquisition, management, and restoration programs;
- ☐ New or revised Special Area Management Plans (SAMP) or plans for Areas of Particular Concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,
- ☒ New or revised guidelines, procedures and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government and other agencies that will result in meaningful improvements in coastal resource management.

B. Describe the proposed program change(s) or activities to implement a previously achieved program change. If the strategy will only involve implementation activities, briefly describe the program change that has already been adopted, and how the proposed activities will further that program change. (Note that implementation strategies are not to exceed two years.)

Delaware's Section 309 Strategy will undertake several tasks to address the priority needs identified in the Section 309 Assessment. These include the development of a Marine Management Plan for Delaware's Atlantic Coast Marine Area, a project to conduct the initial implementation of actions from the Delaware Sea Level Rise Adaptation Plan, and a broader effort to plan for Climate Change Adaptation that will build upon the Sea Level Rise Adaptation planning efforts to address key issues identified in addition to coastal inundation.

Management Plan for Delaware's Atlantic Coast Marine Area

This project will build upon ongoing efforts by the Mid-Atlantic Regional Council on Oceans to ensure the State of Delaware has an ocean resource management plan to guide state Ocean Resource use decisions within the larger regional context of the Mid-Atlantic. To accomplish this, the Delaware Coastal Programs will undertake a multiyear process to develop a Marine Management Plan for Delaware's Atlantic Ocean Area.

This Marine Management Plan will include a set of policies to ensure the sound management of the Delaware's Atlantic Ocean Area. These policies may take the form of detailed guidance, executive orders, regulations, or statutory changes. In addition, they will be used to guide all federal consistency determinations, including interstate consistency, in accordance with the Federal Coastal Zone Management Act for actions affecting Delaware's ocean resources.

As part of this project, we will also undertake a detailed bottom substrate mapping effort to provide critical data for direct use in the development of the Marine Management Plan for Delaware's Atlantic Coastal Marine Area. Currently, there is very little data available for our ocean floor in this area. Collection of this data and information will help ensure the State's issues and concerns are addressed through a predictable science based framework for decision making. In addition to the bottom substrate data collected in the mapping effort, this task will also help to identify any existing and desired data that would strengthen the scientific foundation of Delaware's marine spatial plan.

The marine spatial planning effort will be closely coordinated with Mid-Atlantic Regional Council on Oceans, and is expected to provide a more consistent framework for decision making throughout the Mid-Atlantic. The plan is expected to address issues such as siting offshore renewable energy facilities, shipping navigation, habitat protection, sand resource extraction, and other potentially conflicting uses. The final plan provides a comprehensive framework for managing, reviewing, and permitting proposed uses of state waters that can be implemented through existing state programs and regulations.

Delaware Sea Level Rise Adaptation Plan Refinement and Early Implementation

The Delaware Coastal Programs will use Section 309 funds to ensure the refinement and early implementation of Delaware's Sea Level Rise Adaptation Plan. This plan is currently under development and is expected to be completed in the coming 18 months. Once completed, we will use Section 309 funds to ensure the early implementation of new policies and authorities, and may also be used to refine or further develop policies to reduce future problems associated with Sea Level Rise.

Climate Change Adaptation Strategy Development and Early Implementation

Concurrent with the Sea Level Rise Implementation project, the DCP will build upon this work to broaden the Sea Level Rise Adaptation Strategy to include a broader range of climate change issues that we can reasonably expect to affect Delaware's Coastal Zone. This will likely entail a structured stakeholder process as a logical outgrowth of the established Sea Level Rise adaptation efforts, to ensure Delaware has a plan for adapting to the broad range of climate impacts that may be experienced due to a changing climate.

Need(s) and Gap(s) Addressed

Identify what priority need the strategy addresses, and explain why the proposed program change or implementation activities are the most appropriate means to address the priority need. This discussion should reference the key findings of the Assessment and explain how the strategy addresses those findings.

This strategy addresses numerous priority needs related to Ocean Resources, Coastal Hazards, and Secondary and Cumulative Impacts.

During the first two years of this strategy, our efforts will focus on the priority needs that have been identified for Ocean Resources and Secondary and Cumulative Impacts. The primary program

change will be the development of a Marine Management Plan for Delaware's Atlantic Coast Marine Area.

The plan will develop the needed tools, including new policies and guidelines, to more effectively manage our ocean resources that are experiencing a number of competing uses and pressures. A complimentary strategy effort to map the bottom substrate of Delaware's Ocean Area will provide critical data and information for plan development. As part of the planning process, we will provide stakeholder engagement processes to address the management of our ocean resources locally, regionally, and federally.

The plan development effort will combine, integrate, and supplement the tools already established as part of the GIS Portal developed for the MARCO to ensure we not only have the information to make sound policy decisions, but the tools to apply this information in a decision relevant manner. This effort will focus on habitat management, particularly to address fishery concerns related to impacts of various ocean uses as well as other impacts such as the effects of proposed wind turbines on sea birds, mammals, and turtles. These factors, along with other issues such as the location of navigation channels and sand resource areas will help with developing siting criteria for offshore renewable energy projects.

The marine management plan will also consider the need for more regionally coordinated energy policies, regulations, and programs for offshore renewable energy. This will build on the work currently underway by ELI to conduct a review of the regional policies and to make recommendations for their improvement or the filling of any gaps identified.

The marine management planning effort will also help address a priority need under cumulative and secondary impacts to improve coordination with federal agencies. While we develop our State plan, it will be fully integrated with the regional planning efforts of MARCO. Both our State plan and MARCO must also be coordinated with the Federal efforts for Coastal and Marine Spatial Planning.

Addressing these priority needs in a comprehensive way will require a deliberative planning effort that engages the many stakeholders. The plan will have a variety of positive and negative consequences for various stakeholders, all of whom need to be engaged in the process to work out the most beneficial approach. Involvement of the many groups potentially impacted, and having them impart their ideas and expertise will be critical to successful development of the policy framework needed for the management of Delaware's Ocean Resources.

During the strategies out years (year 3-5), the focus will shift to the priority needs identified for Coastal Hazards. The focus will shift to the refinement and implementation of new policies expected to arise from the ongoing efforts of the Delaware Coastal Programs development of a Statewide Sea Level Rise Adaptation Plan and an effort to expand Delaware's climate adaptation efforts beyond the initial focus on sea level rise to include the broader impacts of a changing climate.

Delaware has established a formal committee for development of its Statewide Sea Level Rise Advisory Committee, has developed an initial policy for the Department of Natural Resource and Environmental Control for planning for Sea Level Rise, and has conducted extensive technical work to develop statewide inundation scenarios. This work is expected to be completed within 18 months and include a number of detailed policy recommendations. This will be followed by continuing efforts to develop and promulgate the various recommended policies, most of which are expected to be clear program changes. The efforts in out years will be targeted to help with the early

implementation of some of these recommendations, as well as to provide support for development of new policies that were recommended but not developed and approved.

Early implementation efforts will likely include addressing key priority needs outlined in the Assessment. Examples include providing assistance in the development of coastal resiliency plans for coastal communities to help them address the recommendations of the Statewide Sea Level Rise Adaptation Plan or to meet any new policies, developing community based adaptation plans with more detail than the Statewide plan, and other activities such as developing a State statute for the maintenance and management of coastal flood protection levees.

Use of Section 309 Strategy funds for these early implementation efforts are crucial to ensure the implementation of the critical policies needed to address these coastal hazards. These funds have proven to be a more effective tool when working with other agencies and communities due to the flexibility they provide by not having a local match requirement that sometime restricts participation, particularly in challenging fiscal times such as those we are currently experiencing in Delaware.

Benefit(s) to Coastal Management

Discuss the anticipated effect of the program change or implementation activities including a clear articulation of the scope and value in improved coastal management and resource protection.

In recent years, Delaware has experienced a significant increase in interest and activity involving proposals for the use of our ocean resources. Much of this has been driven by the strong interest in developing offshore wind facilities. Bluewater Wind has a detailed plan for an offshore wind farm off of Delaware's coast and has secured a long term power purchase agreement to sell the energy produced. Delaware's Governor is also a strong supporter of renewable energy, and the administration is working hard to make it a reality.

The emergence of this new ocean resource use along with other potential emerging uses such as developing an offshore transmission line, the use of sand resources for beach renourishment, fisheries interests, habitat protection, and navigation issues presents a high potential for user conflicts if not well planned. The State of Delaware does not currently have a detailed plan to address these conflicts and ensure the sound use of our ocean resources. Delaware has very few guidelines for making decisions on the suitable ocean uses or for considering appropriate siting of various uses. Developing a clear comprehensive management plan for our Ocean Resources is necessary to ensure the wise use of this resource in a manner that minimizes user conflicts and avoidable damage to fragile ocean resources. This program change will provide the guidance and tools to make well informed and consistent decisions regarding the sustainable use of Delaware's ocean resources.

Work is well underway to develop a Statewide Sea Level Rise Adaptation plan. This plan is expected to provide clear guidance and recommendations for Delaware's response to rising waters. However, additional resources will be needed to ensure the implementation of this plan. Our experience in Delaware is that early implementation of major initiatives, such as a plan to adapt to sea level rise, is critical to the long term success of these programs and policies that change the way we do business in our coastal areas.

By providing some startup funds for implementation, or "seed" money, we will drastically improve the likelihood of long term success. This will not only help better prepare our coastal communities for the potential impacts of sea level rise, but will make them more resilient to the current levels of inundation and damage of coastal storms that already occur. It will enhance our current coastal hazards efforts as well as help prepare us for future coastal inundation associated with any rise in sea level.

While work is underway for Sea Level Rise, Delaware does not currently have a plan to address the broader set of issues that may impact our coastal state as a result of climate change. These problems range from health impacts related to additional heat stress, changes in rain patterns, shifting of species ranges and habitats, and many others impacts. Many of these issues have been raised during stakeholder meetings on sea level rise adaptation planning. While they are not currently being addressed, they are being documented and catalogued for future work under this 309 Strategy. The stakeholder network is currently being developed as part of the SLR adaptation efforts, and this project will be a logical extension and outgrowth of that effort. This also has the added benefit of having built many of the working relationships and developing an agreed upon process to address the issues, which will both increase the project's efficiency and likelihood of success.

Likelihood of Success

Discuss the likelihood of attaining the proposed program change and implementation activities. The state or territory should address: 1) the nature and degree of support for pursuing the strategy and the proposed change; and, 2) the specific actions the state or territory will undertake to maintain or build future support for achieving and implementing the program change, including education and outreach activities.

All three projects have a very high likelihood of success due to the interest from the current Administration in Delaware, the efforts underway by MARCO, and the preliminary work underway that positions these projects for success.

Due to the strong interest in offshore wind development and concern about the environmental permit process, strong support exists in Delaware to develop a clear and predictable process for review of offshore ocean resources. The Marine Management Plan for Delaware's Atlantic Coast is expected to develop a process that reduces permitting uncertainty and streamlines the currently complex permit process.

Considerable prerequisite work has been completed or is underway for each of these projects, drastically increasing the likelihood of success. Delaware has been actively involved with the MidAtlantic Regional Council on Oceans for approximately 2 years, during which time the five Mid-Atlantic States have worked together to better define the regional needs for marine spatial planning, including work to define some of the State specific activities and how to best integrate them into the regional efforts. This involvement will continue and provide a strong complementary effort for Delaware's proposed strategy for Marine Management Planning.

Delaware has also recently contracted with the Environmental Law Institute to conduct a review of the enforceable policies and gaps related to ocean management. This work will be completed prior to the marine spatial planning effort, providing critical insights to the stakeholders on the need for program changes.

For the Benthic Mapping subtask that will support the science based marine planning efforts, Delaware Coastal Program staff have successfully completed this work in the Delaware River and Bay in recent years, and will apply this proven approach using existing staff and equipment to our Ocean bottom. Our partnership with Delaware Division of Fish and Wildlife for use of the Fisheries Section's research vessel will ensure the success of this project.

Finally, the Delaware Coastal Programs were recently administratively reorganized into a new operating unit. This move from a Section in the Division of Soil and Water Conservation to a new Climate Change and Coast operating unit highlights the new emphasis of the Administrative on a new approach for coordinated efforts of Coastal Management and Climate Change Adaptation. This new

emphasis and administrative change is further evidence of the priority support for the coastal management and climate adaptation tasks outlined in this strategy.

Strategy Work Plan

Using the template below, provide a general work plan that includes the major steps necessary for achieving the program change and/or implementing a previously achieved program change. The plan should identify significant projected milestones/outcomes, a schedule for completing the strategy, and budget estimates. If an activity will span two or more years, it can be combined into one entry (i.e., Years 2-3 rather than Year 2 and then Year 3). While the annual outcomes are a useful guide to ensure the strategy remains on track, OCRM recognizes that these benchmarks may change some over the course of the five-year strategy due to unforeseen circumstances. The same holds true for the annual budget estimates. If the state intends to fund implementation activities for the proposed program change, describe those in the plan as well. Further detailing of annual tasks, budgets, benchmarks, and work products will be determined through the annual award negotiation process.

Management Plan for Delaware's Atlantic Coast Marine Area

Delaware's Atlantic Coastal Marine Area Management Plan will result a series of program changes, including new policies and guidelines for effectively manage our ocean resources. This work will be conducted over a three year period and will address a number of emerging issues. Funding will be used for staff support, supplies and materials necessary to support the stakeholder involvement process, and for the collection of existing information and new benthic substrate data.

The major steps in the process will include:

- Identifying regional objectives
- Conducting a needs assessment of existing and desired data for informed decision making
- Collecting bottom substrate and benthic baseline data
- Identifying existing efforts that should help shape the marine spatial plan
- Engaging stakeholders and the public
- Consulting scientists and technical experts
- Analyzing data, uses, services, and impacts
- Develop and evaluate alternative future spatial management scenarios and tradeoffs
- Prepare and implement a marine spatial plan
- Developing a State policy guideline and consistent approach to plan implementation of the Delaware plan, with coordination with other states to maximize consistency in the Mid-Atlantic Region.

A team of key stakeholders will be assembled into a working team to guide the process, with staff support from the Delaware Coastal Programs. In addition to a series of working meetings by this committee, a larger more inclusive workshop will be held to provide broad input for the identification, characterization and prioritization of the plans primary issues and objectives.

In addition to this policy focus group, a scientific and technical committee will be established to help identify all existing information and how best to make it more decision relevant to the highest priority management issues.

A major data gap limiting Delaware's ability to make sound ocean resource use decisions is a lack of data about Delaware's Ocean bottom. To address this concern and provide critically needed data in

support of Delaware's Marine Spatial Planning effort, the DCP will conduct the baseline mapping for the Delaware Ocean's benthic and sub-bottom area. The mission of this project is to identify and map the benthic habitat and sub-bottom sediments of the Delaware Ocean resources, and supply this information in a form decision makers and stakeholders can easily use that will aid them in their efforts to manage and conserve the Delaware Ocean resources.

The Delaware Bay Benthic Mapping Project will complete the benthic and sub-bottom mapping of Delaware's Ocean bottom out to the 3 mile limit. This is an area of approximately 75 square miles, which will take approximately 45 ship days over a two year period. Data collection will be completed using the Delaware Fish and Wildlife 64 foot research vessel, RV First State. The analyzed data from the mapped areas will be finalized into bottom substrate and habitat maps, biological resources locations (i.e. shellfish beds, location of sessile critically important biota {Sabellaria vulgaris} and potential locations of essential fish habitat (EFH) designation), sediment grab samples and coring locations, 3D bottom sediment and bathymetry integration, region of sediment deposition and erosion, and potential locations of beach replenishment borrow sites.

Once the key issues are well defined and prioritized and the available data is compiled into a format useful for making sound ocean resource management decisions, various management strategies will be identified and evaluated. Criteria will be developed to determine the best options to pursue, and these will be incorporated in the marine management plan.

The final step will be to develop and adopt the needed program changes to implement the plan.

Total Years: 3
Total Budget: 216,000
Final Outcome(s) and Products: Early Implementation of Delaware's Atlantic Coast Marine Management Area Plan

Year(s): 1
Description of activities:

- Establish an advisory committee of ocean management stakeholders to guide plan development.
- Identifying regional objectives
- Consulting scientists and technical experts
- Conducting a needs assessment of existing and desired data for informed decision making
- Collecting bottom substrate and benthic baseline data
- Identifying existing efforts that should help shape the marine spatial plan
- Engaging stakeholders and the public to provide input on issues and to provide information useful for a detailed characterization of these issues.

Outcome(s):

- Development of an Issue Identification and Characterization Document that clearly articulates the key regional objectives of the plan.
- Development of a white paper on existing and desired data needed to make informed ocean resource management decisions.
- Completion of bottom substrate data for 25-50 square miles of Delaware's Ocean bottom out to the three mile limit.

Budget: $ 101,000
($ 65 K salary and OEC, 30K Contractual for RV First State Vessel, 6 K Supplies)

Year(s): 2
Description of activities:

- Consulting scientists and technical and other experts (continued)
- Analyzing data, uses, services, and impacts
- Collecting bottom substrate and benthic baseline data
- Develop and evaluate alternative future spatial management scenarios and tradeoffs
- Prepare marine spatial plan
- Developing a State policy guideline and consistent approach to plan implementation of the Delaware plan, with coordination with other states to maximize consistency in the Mid-Atlantic Region.

Outcome(s):

- Completion of the full 75 miles of Delaware Atlantic Ocean bottom substrate.
- Completion of Delaware's Atlantic Coast Marine Management Area Plan

Budget: Budget: $ 101,000
($ 65 K salary and OEC, 30K Contractual for RV First State Vessel, 6 K Supplies)

Year(s): 3
Description of activities:

- Additional work to develop and promulgate policies recommended in Delaware's Atlantic Coast Marine Management Area Plan
- Support for early implementation of Plan

Outcome(s):

- Early Implementation of Delaware's Atlantic Coast Marine Management Area Plan

Budget: Budget: $ 24,000
($ 65 K salary and OEC, 30K Contractual for RV First State Vessel, 6 K Supplies)

Delaware Sea Level Rise Adaptation Plan Refinement and Early Implementation

Delaware's Sea Level Rise Adaptation planning process will result in a series of recommendations for state and local agencies to undertake that will reduce our future economic, social and environmental vulnerability to the effects of future sea level rise. The final recommendations for the plan will be complete in the fall of 2011. Although no recommendations have yet been drafted, it is likely that there will be a call to incorporate issues of sea level rise into existing state policies and regulations for wetlands management, flood control and dike management, beach management, water allocation, development patterns and building codes. All of these policies are part of the Delaware Coastal Program, but are expected to need program changes and updates for more effective use as tools for sea level rise adaptation.

In order to be implemented, initial work on development of the recommendations is expected to better describe the operational details and constraints for various recommendations. Based on this information, additional refinement will be needed and completed in 2013, followed by the implementation phase of the Sea Level Rise Adaptation Plan during the fall of 2014 and 2015. With the assistance of the Advisory Committee, recommendations will be ranked using standard criteria. High priority items for which funding exists or for which little funding is necessary will likely be implemented quickly, while more complex issues will require careful planning in workgroup settings over a more extended period of time.

Section 309 funding will be utilized beginning in year three of this strategy to fund the data collection and analysis, equipment and staff that are necessary to refine and then, in years 4 and 5, implement the recommendations and policy changes for complex coastal issues such as dike management and water allocation that will result in changes to the approved policies of the coastal management

program. If funding is available, it will also be used to provide technical assistance to local jurisdictions to build capacity and enable them to implement the anticipated program changes as part of local coastal resiliency planning.

Resiliency planning efforts at the community level are expected to provide more localized detail than the broader guidance included in the Statewide strategy, tailored to the appropriate actions to address threats to the specific community in its specific geographic location along the coast.

Total Years: 3
Total Budget: 156,000
Final Outcome(s) and Products: Implementation of Statewide Sea Level Rise Adaptation Plan

Year(s): 3
Description of activities:

- Refinement of recommended actions based on more detailed assessment of operation details.

Budget: Year 3 = $ 52,000 (Salary)

Year(s): 4
Description of activities:

- Implementation of recommendation in the Delaware Sea Level Rise Adaptation Plan.

Budget: Year 4 = $ 52,000 (Salary)

Year(s): 5
Description of activities:

- Drafting and development of any administrative work for development of additional program changes recommended in the Delaware Sea Level Rise Adaptation Plan.
- Coordination and support to local governments for adaptation planning in accordance with recommendations in Statewide plan.

Budget: Year 5 = $ 52,000 (Salary)

Climate Change Adaptation Strategy Development, Refinement and Early Implementation

As an out year task, the Delaware Coastal Program will undertake efforts to develop a climate change adaptation plan. This plan will be focused on non mitigation efforts, since it is fully expected that these issues will be addressed concurrently by Delaware's Energy Office.

Delaware is well underway in establishing a Sea Level Rise Adaptation Plan, which is considered to be one of the impacts of Climate Change expected to have significant impacts on the coastal state. As part of the stakeholder involvement efforts for this process, it is anticipated that additional information will emerge regarding broader climate change issues. The DCP will opportunistically capture this information, and incorporate it into a longer term strategy for climate change consideration, building upon the lessons learned during the SLR Adaptation planning process.

This information will then be used to guide the broader climate change adaptation planning effort for the State. It is expected that many of the stakeholders involved in the Sea Level Rise Adaptation Plan will continue to be involved.

The major steps of the project include:

- Build upon initial list of climate change issues and concerns to develop a comprehensive list of potential impacts of climate change on Delaware (other than those already addressed as part of the Sea Level Rise Adaptation Plan.
- Refine the stakeholder committee to develop the adaptation plan.
- Engage a broad audience in a workshop setting to indentify, characterize, and prioritize the climate change issues of greatest concern.
- Review and prioritize climate change issues in Delaware and develop a report on the state of the science, policy, and regulatory environment.
- Determine the vulnerability and potential impacts of each of these concerns to the State of Delaware.
- Develop recommendations for comprehensive climate change adaptation planning, management strategies and regulatory revisions.
- Implement program changes to ensure climate change adaptation efforts are implemented.

Total Years: 3
Total Budget: 123,000
Final Outcome(s) and Products: Development, Refinement and Early Implementation of Delaware Climate Change Adaptation Plan

Year(s): 3
Description of activities:
- Build upon initial list of climate change issues and concerns to develop a comprehensive list of potential impacts of climate change on Delaware.
- Refine the stakeholder committee to develop the adaptation plan.
- Design a workshop and process to identify, characterize, and prioritize the climate change issues of greatest concern.

Outcome(s):
- Detailed list of key climate change issues for Delaware and detailed draft characterizations of these issues.
- Establishment of a core committee charged with guiding the development of the adaptation plan development.
- A clear process for plan development and detailed logistical plan for a broad stakeholder engagement workshop on climate change issues and adaptation options.

Budget: Year 3 = $ 24,000 ($ 24 K salary/0.4 FTE)

Year(s): 4
Description of activities:
- Engage a broad audience in a workshop setting to indentify, characterize, and prioritize the climate change issues of greatest concern.
- Review and prioritize climate change issues in Delaware and develop a report on the state of the science, policy, and regulatory environment.
- Determine the vulnerability and potential impacts of each of these concerns to the State of Delaware.
- Develop recommendations for comprehensive climate change adaptation planning, management strategies and regulatory revisions.
- Refine recommendations for adaptation strategies.
- Develop and publish Delaware Climate Adaptation Plan

Outcome(s):

- Detailed workshop summary of stakeholder input
- Delaware Climate Change Adaptation Plan.

Budget: Year 4 = $ 49,000 ($ 49 K salary/0.8 FTE)

Year(s): 5

Description of activities:

- Implementation of recommendation in the Delaware Climate Change Adaptation Plan.
- Drafting and development of any administrative work for development of additional program changes recommended in the Delaware Climate Change Adaptation Plan.

Outcome(s):

- Implementation of actions and policies from Delaware Climate Change Adaptation Plan.

Budget: Year 5 = $ 49,000 ($ 49 K salary/0.8 FTE)

Fiscal and Technical Needs

A. Fiscal Needs: If 309 funding is not sufficient to carry out the proposed strategy, identify additional funding needs. Provide a brief description of what efforts the applying agency has made, if any, to secure additional state funds from the legislature and/or other sources to support this strategy.

The State of Delaware is working with the five states that make up the Mid-Atlantic Regional Council on Oceans to secure funding for regional ocean governance and marine spatial planning. Applications are being prepared for submittal to NOAA, and are also expected to be used for other funding requests. Additional funding is needed to ensure the regional involvement and coordination of Delaware's Marine Management Plan efforts with the regional and Federal efforts.

B. Technical Needs: If the state does not possess the technical knowledge, skills, or equipment to carry out the proposed strategy, identify these needs. Provide a brief description of what efforts the applying agency has made, if any, to obtain the trained personnel or equipment needed (for example, through agreements with other state agencies).

The Delaware Coastal Programs along with the network of programs it coordinates within Delaware, Federal partners we work with, and nongovernment agencies we have close working relationship with have the technical knowledge and skills to complete this strategy.

Delaware previously acquired acoustic mapping equipment, trained technical staff to conduct bottom substrate mapping, and mapped the Delaware Bay Area. In addition, we have developed a cooperative partnership with the Delaware Division of Fish and Wildlife for use of their 64 foot research vessel (now equipped with transducers and acoustic mapping equipment) that will allow us to utilize this equipment and expertise in our ocean waters.

For policy development, Delaware has already contracted with the Environmental Law Institute to conduct a detailed review of our policies and legal authorities for managing our Atlantic Marine area, ensuring that this legal expertise will have already been provided prior to the initiation of this strategy.

Projects of Special Merit (Optional)

If desired, briefly indicate what PSMs the CMP may wish to pursue to augment this strategy. Any activities that are necessary to achieve the program change or that the state intends to support with baseline funding should be included in the strategy above. The information in this section will not be used to evaluate or rank PSMs and is simply meant to provide the CMPs the option to provide additional

information if they choose. PSM descriptions should be kept very brief (e.g., undertake benthic mapping to provide additional data for ocean management planning). Do not do provide detailed project descriptions that would be needed for the PSM competition.

The Delaware Coastal Programs, in cooperation with our state partners that comprise the Mid-Atlantic Regional Council on Oceans (MARCO), will likely pursue one or more regional projects that are a high priority in the Delaware 309 Assessment and a high priority for MARCO. The projects fall under the high priority areas of Ocean Resources and/or Coastal Hazards.

Projects of Special Merit may include efforts for Marine Spatial Planning, Habitat Protection, Offshore Energy, and/or Climate Change.

A general description of the key steps for each of these is provided below.

Marine Spatial Planning Project of Special Merit

Delaware has identified marine spatial planning as a high priority need under ocean resources. In addition, the MARCO states are each taking steps that will aid in development of a marine spatial plan for ocean waters of the region and will coordinate through MARCO to ensure the plans are integrated across the Mid-Atlantic region. As MARCO moves forward, we will also coordinate with, and be responsive to, the Ocean Policy Task Force's Coastal and Marine Spatial Planning (CMSP) process.

A project of special merit may be developed to support these efforts by assisting with the key steps in that process including:

- Identifying regional objectives
- Identifying existing efforts that should help shape the marine spatial plan
- Engaging stakeholders and the public
- Consulting scientists and technical and other experts
- Analyzing data, uses, services, and impacts
- Develop and evaluate alternative future spatial management scenarios and tradeoffs
- Prepare and implement a marine spatial plan
- Developing a regional policy guideline for State policies that ensure a coordinated and consistent approach to plan implementation on a regional scale that enables regional objectives to be met with state specific policy actions.

Ocean Resource Habitat Project of Special Merit

A Section 309 priority under Ocean Resources and one of MARCO's goals is to ensure that key ocean habitats of the Mid-Atlantic are protected from activities that threaten their sensitive and unique features, marine populations, and ecological processes.

A project of special merit may be developed to support these efforts by assisting with the key steps in that process including:

1. Protect the region's major offshore canyons from harmful or damaging activities.
2. Identify other key Mid-Atlantic habitats and migratory pathways at risk from harmful or damaging activities and seek appropriate protection measures.
3. Create a regional internet habitat mapping system to aid in identifying and protecting key habitats and migratory pathways.
4. Develop Mid-Atlantic marine habitat protection and restoration policies to guide the management of key priority habitats.

Offshore Energy Project of Special Merit

A Section 309 priority under Ocean Resources and one of MARCO's goals is promoting sustainable development of offshore renewable energy resources by addressing regulatory barriers and regional issues regarding potential impacts of development.

A project of special merit may be developed to support these efforts by assisting with the key steps in that process including:

1. Develop shared research and monitoring protocols for proposed energy development in the marine environment, which will be incorporated into the permitting process.
2. Examine and define regulatory steps, timeframes and identify potential barriers to developing offshore renewable energy.
3. Create an offshore use mapping and decision-support tool(s) to aid in responsible siting of offshore renewable wind energy projects.

Climate Change

A Section 309 Priority under coastal hazards and one of MARCO's goals includes preparing the region for the impacts of climate change, primarily sea level rise impacts on regional infrastructure, coastal habitat, and shoreline management.

A project of special merit may be developed to support these efforts by assisting with the key steps in that process including:

1. Identify regional transportation infrastructure that is vulnerable to sea level rise and increased flood hazards.
2. Acquire data needed to assess regional vulnerability to climate change and sea level rise impacts to infrastructure and coastal habitats.
3. Create a means of storing and delivering the data needed to make decisions.
4. Institute sharing of coastal vulnerability, community resiliency and management information
5. Initiate sea level rise adaptation measures to collectively reduce the region's vulnerability to climate change and sea level rise.

5-Year Budget Summary by Strategy

At the end of the Strategy section, please include the following budget table summarizing your anticipated Section 309 expenses by strategy for each year.

Strategy Title	Year 1 Funding	Year 2 Funding	Year 3 Funding	Year 4 Funding	Year 5 Funding	Total Funding
Management Plan for Delaware's Atlantic Coast Marine Area	101,000	101,000	24,000			216,000
Delaware Sea Level Rise Adaptation Plan Refinement and Early Implementation			52,000	52,000	52,000	156,000
Climate Change Adaptation Strategy Development, Refinement and Early Implementation			25,000	49,000	49,000	123,000
Total Funding	101,000	101,000	101,000	101,000	101,000	505,000